Investigating the progress of Dubai private schools' PISA and TIMSS results and school inspection reports from 2011 to 2018

دراسة التقدم الذي أحرزته المدارس الخاصة في دبي من خلال نتائج الاختبارات الدولية PISA وTIMSS وتقارير الرقابة من العام 2011 وحتى العام 2018

by

RAED BDEIR

A thesis submitted in fulfilment

of the requirements for the degree of

DOCTOR OF EDUCATION

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ABSTRACT

International assessments have made an impact on many countries' national education policies. In 2014, His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice-President and Prime Minister of UAE, and Ruler of Dubai, launched the UAE National Agenda, detailed in the 'UAE Vision 2021' policy document, which includes an objective to put the UAE among the top 15 countries in the Trends in International Mathematics and Science Study (TIMSS) and top 20 in the Programme for International Student Assessment (PISA), by 2021. A mixed method approach investigated the progress of private schools in Dubai using their results from PISA 2012 and 2015, TIMSS 2011 and 2015, PISA-based Test for Schools (PBTS) 2017; analysis of schools' inspection reports; and the views of the schools' principals. The findings show more progress in TIMSS results than in PISA. The researcher recommends that schools should modify their curricula, and improve the teachers' strategies and students' critical thinking and problem-solving skills, in order to meet National Agenda targets. Further research is recommended after PISA 2018 and TIMSS 2019, correlating the results with analysis of inspection reports.

موجز البحث

تعتبر الاختبارات الدولية من المكونات الأساسية لسياسات التعليم في العديد من دول العالم، وذلك لتأثير نتائج هذه الاختبارات على جودة التعليم المقدم فيها. وتعد دولة الامارات العربية المتحدة من الدول التي أحرزت تقدما كبيرا بين دول العالم في العديد من المجالات. وكمبادرة من العديد من المبادرات الوطنية، أعلن الشيخ محمد بن راشد نائب رئيس الدولة ورئيس مجلس الوزراء وحاكم إمارة دبي في العام 2014 عن الاجندة الوطنية لدولة الامارات العربية المتحدة، والتي تم توضيحها في وثيقة رؤية الامارات 2021. كان هدف الاجندة الوطنية في مجال التعليم، جعل نظام التعليم في الدولة من أفضل أنظمة التعليم العالمية. ووضع الامارات في المرتبة الخامس عشرة في اختبار TIMSS وفي المرتبة العشرين في اختبار PISA. يهدف هذا البحث لدراسة التقدم الذي أحرزته المدارس الخاصة في دبي لتحقيق أهداف الأجندة الوطنية. ويستخدم البحث مزيجا من الأساليب الكميه والعينية لدراسة نتائج عينه مختاره من المدارس الخاصة في دبي والتي خضعت لاختبارات PISA في الأعوام 2012 و2015 واختبار TIMSS في الأعوام 2011 و2015، واختبار PBTS الخاص بالمدارس في العام 2017، بالإضافة الى تحليل تقارير الرقابة المدرسية وتحليل استبانة مدراء المدارس الخاصة بهذا الخصوص. لقد أظهرت النتائج بان هناك تقدما في أداء المدارس في اختبار TIMSS بشكل افضل لتحقيق هدف الأجندة الوطنية مقارنة بنتائج اختبار PISA. كما يوصى الباحث المدارس الخاصة في دبي ان تقوم بتعديل المنهاج الخاص بها ومواءمته مع اطار PISA وTIMSS، وتطوير استراتيجيات التدريس المستخدمة من قبل المعلمين لتعزيز مهارات التفكير الناقد والبحث وحل المشكلات عند الطلبة. كما وأكد الباحث على ضرورة الاستمرار في هذا البحث وذلك بعد اجراء اختبارات PISA 2018 وTIMSS 2019 ولربط نتائج هذه الاختبارات مع تقارير الرقابة المدرسية للتأكد من تحقيق أو عدم تحقيق الاجندة الوطنية في العام 2021.

DEDICATION

To my twin soul and deep love in my heart

To my wife Rajaa who supported me without limits

Raed

ACKNOWLEDGMENTS

My journey of getting my Doctorate of Educational was a journey full of interesting experiences. To get the a higher qualification degree is only one part of the journey. The change that had been created in me due to this was big and I had become a person who is looking for challenge and new experiences always. I was not able to complete this journey without the presence and big support of my wife, my family and especially my mother to me all the time and without the people who supported me in this journey.

I would like to thank my supervisor Dr. Abdulai Abukari, his guidance and support throughout my study was of challenging and valuable. His feedback on each chapter and the discussion we had from the beginning help me and hence, made me more secure in my research and skills.

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Chapter 1: Introduction

This study investigated the progress of private schools in Dubai towards achieving the National Agenda Policy (NAP), using the results of the Programme for International Student Assessment (PISA) 2012 and 2015, the results of the Trends in International Mathematics and Science Study (TIMSS) 2011 and 2015, and the results of the PISA-based Test for Schools (PBTS) 2017. In addition to these, schools inspection reports over three academic years (2015-2016, 2016-2017 and 2017-2018) were examined and the Principal's perceptions were taken into account. All the above data were studied to measure the schools' progress.

The National Agenda Policy (NAP) was announced in 2014 by His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice-President and Prime Minister of UAE, and Ruler of Dubai. The NAP included eight objectives that should lead the UAE to be amongst the most successful countries in providing a world-class education (UAE Vision 2021); in addition to providing schools with concrete targets against which they can measure their progress towards achieving the UAE Vision 2021 through international assessments. Two of these objectives to be achieved were:

1- To be among the 20th highest performing countries in PISA.

2- To be among the 15th highest performing countries in TIMSS.

TIMSS, PISA and PBTS differ in their objectives and the kinds of skills they measure. Briefly, TIMSS is designed to measure how well students have learned cognitive skills taught in school by the 4th and 8th grades in math and science domains. PISA and PBTS test how well 15-years-olds still in school could apply such skills to practical, real-life situations and problems in the math, science and reading domains.

Rutkowski et al (2013) state that it was in late 1950 when Tersten Husen, Benjamin Bloom and C. Arnold said, "Why don't we test for academic achievement internationally?" and hence, "the

world could be our laboratory." This was the origin of the International Association for the Evaluation of Educational Achievement (IEA). Since then many of the international tests have been become more frequent and more global, now involving more than 60 countries. In the early 1990s, criticisms of international testing contained the argument that countries sent lower portions of their age cohorts to secondary school, hence sampling could be an issue. Rutkowski et al (2013) listed the main advantages of international achievement testing to be:

- To observe the consequences of different local policies and practices.
- To test what is realistic in terms of local education policy.
- To introduce concepts that have been overlooked locally.
- To raise important questions, or challenge assumptions, using local sources of information alone.
- To provide results that were not anticipated but nevertheless have high value.

Kyriakides et al (2017) mentioned that international comparative studies such as TIMSS and PISA are mainly concerned with student-level factors (e.g., students' background characteristics, motivation, and learning opportunities) and to some extent with school-level factors (e.g., teaching practices and school climate), and so secondary analysis of these studies searches for the impact of other than system-level factors on student achievement. The system-level variables that were available are mainly concerned with the structure of the system and school autonomy, rather than the national educational policy.

Identifying the different components will help the policy-makers and the educational leadership to make future decisions on how to set their priorities and how to modify or change such priorities to better improve students achievements in these international assessments.

1.1 Background

UAE aims to achieve it targets of becoming in 2021 among the 20th highest-scoring countries in PISA and to be among the 15th highest countries in TIMSS. By reaching these targets, private schools in Dubai will achieve the National Agenda targets. To achieve these two ranks could impose a big demand on the schools' outcomes for a country that was founded as recently as 1971 and with an educational system that has just started to improve.

Gaad et al (2006) mentioned that UAE schools must identify the scope of the content of the curriculum and must understand the students whom it is targeting. The curriculum must have a supporting structure for these processes and schools must train and employ teachers to implement this curriculum within their school.

Guillermo and Tamara (2016) mentioned that international assessment, especially PISA and TIMSS, has played an increasingly important role in educational policy. These international tests generate valuable information about each country's performances. Sebeer (2013) emphasised the importance of TIMSS in making a turn towards an evidence-based educational policy. Lewis et al (2016) suggested that the PISA-based Test for Schools provided an exemplary demonstration of heterarchical governance, in which vertical policy mechanisms open up horizontal spaces for new policy actors. It also creates commensurate spaces of comparison and governance, enabling the Organization for Economic Cooperation and Development (OECD) to reach into school-level spaces and directly influence local educational practices. The ambition of many countries across the world is to achieve a higher ranking in international assessments such as PISA, TIMSS and PBTS, and the issue is what were the elements to be set as priorities for the school leaders and policy-makers in order to improve their school targets.

Schleicher (2018), initiator of the OECD as an international authority on education policy, has guided education leaders in over 70 countries in their efforts to design and implement forward-

looking policies and practices for PISA. While, improvement in education is far easier to proclaim than achieve, Schleicher examined the many successes from which we can learn and look seriously and dispassionately at good practice in our own countries and elsewhere, to understand what works, in which contexts.

Lenkeit and Schwippert (2018), discussed that International Large-Scale Assessments (ILSAs) as an influential instrument for assessing and evaluating quality and equity across education systems and informing educational policies. The data collected in studies such as the Programme for International Student Assessment (PISA), the Progress in International Reading Literacy Study (PIRLS) and the Trends in International Mathematics and Science Study (TIMSS) provide many opportunities to investigate a broad range of research questions that are most often related to student attainment in specific subjects. In addition, the data enabled researchers to examine related topics, for instance, the impact of teacher and instructional characteristics on learning and attitudes towards learning, educational inequalities and the effectiveness of school and systemic characteristics. The internationally comparative context in which these questions can be raised and addressed allows us to advance our understanding of the differences and similarities in the learning and teaching environments across national, cultural and regional settings around the world and within national borders, ILSAs can contribute to a better understanding of the structures and mechanisms of the education system (Schwippert & Lenkeit, 2012). This is particularly true in countries where none or only few teachers experiences with national assessments exists.

Strietholt and Scherer (2018) discussed how data from international large-scale assessments (ILSAs) could be utilised and combined with other existing data sources, in order to monitor educational outcomes and study the effectiveness of educational systems. They considered different purposes of linking data, namely extending outcomes measures, analyzing differences

over time or across cohorts, and supplementing context information. Strietholt and Scherer concluded that the main contribution of ILSA to educational research lies in the ways they facilitate analysis of educational policy and policy-related issues at the institutional level by means of cross-country analysis.

Rutkowski (2015) mentioned that the OECD has recently piloted the PBTS in the USA. This new initiative has the potential to further promote the OECD's educational agenda in local policy debates. Rutkowski lay out a theoretical framework around global governance and knowledge production within the context of the OECD. Next, Rutkowski provided a brief overview of the traditional PISA study and compare it to the new PBTS initiative. This context provides the foundation for a discussion of the ways in which a PBTS can operate as a governance tool, allowing international organisations to have greater influence in the formation and implementation of local educational policies.

1.2 Definitions of Key Concepts

- OECD (2019), OECD, The Organization for Economic Cooperation and Development: is an international organisation that works to build better policies for better lives, to shape policies that foster prosperity, equality, opportunity and wellbeing for all. It has almost 60 years of experience and insights and an aim to better prepare the world of tomorrow. The OECD works with governments, policy-makers and citizens on establishing international norms and finding evidence-based solutions to a range of social, economic and environmental challenges. The OECD provides a unique forum and knowledge hub for data and analysis, exchange of experiences, best-practice sharing, and advice on public policies and global standard-setting.
- IEA (2019), IEA, The International Association for the Evaluation of Educational Achievement: is an independent, international cooperative of national research

institutions and governmental research agencies. IEA conducts large-scale comparative studies of educational achievement and other aspects of education, with the aim of gaining in-depth understanding of the effects of policies and practices within and across systems of education. Founded in 1958, IEA has conducted more than 30 research studies of cross-national achievement. IEA studies focus on subjects relating to mathematics, science, reading, civic and citizenship education, computer and information literacy, and teacher education, among others.

- KHDA (2019), KHDA, The Knowledge and Human Development Authority is the educational quality assurance and regulatory authority of the Government of Dubai, United Arab Emirates. It oversees the private education sector in Dubai, including early childhood education centres, schools, higher education providers, and training institutes.
- KHDA (2019), DSIB, The Dubai School Inspection Bureau: DSIB of KHDA was established by Decision 38 of The Executive Council of the Government of Dubai in 2007. DSIB provides comprehensive information on the standard of private school education in Dubai, which helps to inform improvement planning at school and policy level.
- OECD (2019), PISA, The Programme for International Student Assessment: is a triennial international survey which aims to evaluate education systems worldwide by testing the skills and knowledge of 15-year-old students who are nearing the end of their compulsory education. PISA assesses how well students can apply what they learn in school to real-life situations. Over 90 countries have participated in the assessment so far, which began in 2000. Every three years students are tested in the key subjects: reading, mathematics and science.

- IEA (2019), TIMSS, The Trends in International Mathematics and Science Study: is a series of international assessments of the mathematics and science knowledge of students around the world. The participating students come from a diverse set of educational systems (countries or regional jurisdictions of countries) in terms of economic development, geographical location, and population size. TIMSS data have been collected every four years from students at grades 4 and 8 since 1995.
- OECD (2019), PBTS, The PISA-Based-Test for Schools: is a voluntary assessment that supports school improvement efforts and benchmarking, based on the OECD's Programme for International Student Assessment (PISA). Like PISA, it assesses the extent to which 15-year-old students near the end of compulsory education have acquired some of the knowledge and skills that are essential for full participation in modern societies. While PISA is intended to deliver national-level results, the PISA-Based Test for Schools is designed to deliver school-level results for school improvement and benchmarking purposes. Because both assessments are based on the same framework, the results are comparable, meaning that individual schools benchmark their performance with that of national education systems from around the world.
- IEA (2019), PIRLS, The Progress in International Reading Literacy Study: is an international comparative assessment that measures student learning in reading. Since 2001, PIRLS has been administered every five years. PIRLS documents worldwide trends in the reading knowledge of 4th-graders as well as school and teacher practices related to instruction.
- ILSAs: International Large-Scale Assessments. Sellar and Lingard (2014) defined ILSAs as constituting a new mode of infrastructural governance as they spread

capacities to generate, collect, manage and analyse education data across countries around the world.

- KHDA DSIB (2019), NAP, National Agenda Policy: which was developed by over 300 officials from 90 federal and local government entities in the UAE. NAP includes a set of national indicators in the sectors of education, healthcare, economy, police and security, justice, society, housing, infrastructure and government services. These indicators are long-term, measure performance outcomes in each of the national priorities, and generally compare the UAE against global benchmarks. The national indicators are periodically monitored by government leadership to ensure their targets are achieved by 2021.
- KHDA DSIB (2019), NAPm, National Agenda Parameter: is a method that was introduced by KHDA for measuring and monitoring schools' progress towards achieving their individual National Agenda targets. It has recommended certain benchmark tests for schools to assist schools in meeting their assigned targets.
- KHDA DSIB (2019), NAT, National Agenda target: is a target that was set for each of the private schools in Dubai by DSIB towards achieving their individual targets in each of the different international assessment of PISA and TIMSS.

1.3 Statement of the Problem

From the academic year 2015-2016, DSIB started to evaluate private schools in Dubai on their progress of achieving the National Agenda targets, through the yearly inspection visits conducted by the DSIB teams to these schools. An inspection report is published each academic year to show the progress of each school towards a achieving the National Agenda targets. Whether school is able to reduce its gap towards that target or not, is the important question that each school needs to answer, and this research will answer too. Had the schools' leadership

taken actions to modify the curriculum, develop teaching strategies, enhance students' learning skills and adding more learning resources to affect the National Agenda targets for each school? This research will use the PISA 2012 and 2015, TIMSS 2011 and 2015 and PBTS 2017 results and the DSIB inspection reports for each school for the three academic years 2015-2016, 2016-2017 and 2017-2018. In addition to collecting the school Principals' perceptions on their action plans towards achieving the National Agenda targets, it will examine the schools' progress in National Agenda targets in order to reduce the gap towards achieving these targets. It should also help schools identify their strengths and weaknesses and priorities for improvement, because PISA, PBTS and TIMSS assessments attempt to provide cross-nationally comparable evidence on student performance. It was important for policy-makers and educational stakeholders to understand the factors that affected a quality education system.

KHDA's (2013) 'Dubai PISA 2012' report mentioned that the most notable example of the KHDA initiatives was to monitor schools' progress is school inspections and participation in international assessments, which represent the means by which teaching, learning, leadership and student wellbeing can be understood better. Taken together, they comprise a strong evidence base, which ultimately enhances schools and teachers' capacities to support all students towards fulfilling their potential. School inspections began in 2007 which coincided with Dubai's first-ever participation in TIMSS. Two years later, all the Emirate's schools took part in PISA 2009. By 2011, Dubai had participated in all major international assessments, as the second round of TIMSS in Dubai was conducted simultaneously with the PIRLS in that year. Over time, not only has education grown by number of private schools and students in Dubai but there has been additional evidence of significant improvement in the quality of education delivered to students. This has been observed at a local level as well as through international comparative studies of educational systems.

The aim of this research is to check whether private schools in Dubai were able to reduce the gap towards achieving the National Agenda Policy, and whether the schools' leadership will be able to modify the curriculum, develop teaching strategies enhance students' learning skills and add more learning resources to enhance students' achievement and hence affect the progress each school is making to achieve the National Agenda targets.

1.4 Purpose of the Study

This research used a mixed method approach to investigate the progress of private schools in Dubai using their results from PISA 2012 and 2015, TIMSS 2011 and 2015, PISA-based Test for Schools (PBTS) 2017; the analysis of schools' inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018 and the views of the schools' principals.

DSIB has inspected and reported on each school's plan towards achieving the NAT yearly in their schools' inspection reports since the announcement of the National Agenda Policy 2014. In addition to the analysis of each school's international tests results, whether the research will employ an achievement of the National Agenda Policy for the whole country, to:

1- Be amongst the 20th highest performing countries in PISA.

2- Be amongst the 15th highest performing countries in TIMSS.

1.5 Research Questions

This research studied the progress of private schools in Dubai in achieving the National Agenda Policy, through answering the following four questions and triangulating the findings with each other. The research attempted to answer the following main questions:

1- Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?

2- Is there any significant difference between the results of Dubai private schools in PISA 2012, 2015 and PBTS 2017 tests?

3- What are the Principals' perceptions of the implementation of the National Agenda Policy in their schools?

4- Is there any progress of private schools in Dubai towards achieving the National Agenda targets, in their yearly inspection reports for the years 2015-2016, 2016-2017 and 2017-2018?

1.6 Significance of the Study

The researcher believed that the main significance of the current study that it was the first in the UAE and Dubai to evaluate the measurement of the National Agenda target using secondary data of TIMSS 2011 and 2015, PISA 2012 and 2015 and PBTS 2017 results, in coordination with the schools' inspection reports over the past three years. 2015-2016, 2016-2017 and 2017-2018; in addition to the school Principals' perceptions that were collected. The results of this study will be of significant benefit to:

(a) Decision-makers, to make them aware of the implementation status of this policy across the UAE and help them take educational decisions based on research's insights and recommendations.

(b) schools' stakeholders in Dubai, to make them more aware of the challenges towards achieving the National Agenda targets.

(c) students in Dubai, who will benefit from the future directions and hence have better outcomes

(d) future researchers, who may use the insights gained in this study as the basis for similar studies to continue to evaluate research on finding the ways to achieve the National Agenda targets in Dubai and the rest of the Emirates.

The Knowledge and Human Development Authority's (2016) 'Capacity to Grow' report mentioned that KHDA has overseen the expansion of education as a critical pillar of Dubai's

social development. Faced with unparalleled diversity within the student population, education policy-makers in Dubai have introduced innovative actions to ensure quality in education. The measuring and monitoring educational outcomes has taken many forms, using varying degrees of qualitative and quantitative tools.

The KHDA (2017) DSIB 'Learning from each other – Key messages 2016-2017' report mentioned that the number of private schools that participated in the National Agenda Parameter increased to 66%. The report focussed on areas of the inspection process in the National Agenda aspect that was found in the inspected schools:

- Focus on the benchmark test in English, math and science.
- Use data to analyse the international benchmark assessments to improve curriculum, teaching and learning.
- Curriculum adaptations to meet TIMSS and PISA requirements.

Adjustment teaching method to develop students' critical thinking and research skills.

Fischman et al. (2018) examined how international large-scale assessments (ILSAs) have influenced education policy-making at the national level. Based on an exploratory review of research and policy literature on ILSAs, and two surveys administered to educational policy experts, researchers, policy-makers and educators, their research found that ILSAs, with their multiple and ambiguous uses, increasingly function as 'solutions in search for the right problem': they appear to be used as tools to legitimise educational reforms. The survey results pointed to a growing perception among stakeholders that ILSAs are having an effect on national educational policies, with 38% of respondents stating that ILSAs were generally misused in national policy contexts. However, while the ILSA literature indicates that these assessments are having some influence, there is little evidence that any positive or negative causal relationship exists between ILSA participation and the implementation of education reforms. Perhaps the most significant change associated with the use of ILSAs in the literature reviewed

is the way in which new conditions for educational comparison have been made possible at the national, regional, and global levels.

Stacey et al. (2018) studied the impacts of globalisation on science education and curricula which are of considerable interest internationally, not least in terms of preparing a nation's students for employment in a rapidly changing world. Their study was not a measure of the total science curriculum for each country considered, but a measure of the similarity of their intended science curriculum to the TIMSS framework. Further research into the effects on the science curricula of countries that have not participated in TIMSS or using data from other relevant large-scale assessments would add an additional dimension to understanding the globalisation of science curricula. Research exploring the processes by which countries starts on science curriculum reform would be an important avenue for further work in order to gain a better understanding of why countries decide to make the changes they do. The literature revealed that a number of both qualitative and quantitative methods had been used to investigate the globalisation of curricula over time, and the advantages and drawbacks of each of the approaches were considered.

Alromi and Alshumrani (2014) stated that one of the hallmarks of a knowledge economy, society, and culture is when the exchange of knowledge or information becomes a keystone to every activity that occurs. This was done in a study in Saudi Arabia were a formal educational systems exists, which suggests the importance of translating internationally comparative data to local classroom practice in national educational systems worldwide. The educational policy and formal mass education is significantly influenced by the usefulness of big international data: it is significantly influenced by the TIMSS and PISA. In documenting the impact of TIMSS, PISA, or any large-scale assessment data, infrastructure, capacity, and sustainability indicators resulting from a national education system's participation in international

assessments are significant. There are both positive and negative impacts, of course, but a study by Wiseman and Baker in 2001 suggested that the comments from national level policy-makers, state and regional level decision-makers, and local level teachers and school Principals provide a window into the strategic importance of big data for developing knowledge economies (Wiseman & Baker, 2005). Wiseman and Baker asked representatives from each level of the U.S. educational system different questions to elicit their degree of awareness of large-scale assessment data or results, and how they used these big data results for decision-making. The findings were as follows:

- National level policy makers had a high level of awareness about big cross-national comparative education data, but their use of the data and results for decision-making was very general, and largely to support existing reform agendas.
- State and regional level decision-makers were aware that the big cross-national comparative education data existed, but they were not sure which data item was available for decision-making or how relevant it was to their policy and reform processes.
- Local teachers and Principals, however, had very little specific awareness of the large cross-national comparative education assessment itself and no knowledge of the data or results.

Takala et al. (2018) studied in the field of comparative education where there is a vast and growing amount of research on how education policy agenda are formed at the transnational level, and how these may influence policy-making in individual countries. Particularly, the World Bank and the OECD play an important role in the dissemination of education policies. Their study sought to contribute to a more nuanced understanding of how the two organisations have formulated their policy advice concerning quality assurance and the evaluation of school education toward the intended beneficiaries of such advice, either in standardised form or considering local contexts. The case countries were Brazil, China, and Russia, which in terms

of their political power and economic resources differ from the typical World Bank client countries, but at the same time are not OECD members. Takala and colleagues' data consisted of World Bank and OECD publications from the three countries published during two decades from the mid-1990s onward. The document analysis was complemented by some factual information gained through interviews of relevant actors. In the analysed material, prescriptions given in the tone of 'international best practice' were predominant. This position saw the quality of education as a concept that has a globally applicable definition. In addition, the advice directed at Russia and China has in an ambivalent manner acknowledged the sociocultural context of the concept of quality in the national pedagogical tradition.

Touron et al. (2018) discussed the impact of factors linked to the characteristics of teaching practices and students' attitudes towards the use of technology on their performance in mathematics in the process of teaching learning in the Spanish context. In this sense, Toulon's study is a secondary analysis of the PISA 2012 data. Regarding the attitudes and the contextual variables, the results do coincide with the accumulated evidence. However, once these contextual effects are controlled, the negative relationship found between the pedagogic strategies used by the teachers and the mathematics score cannot but convey confusion, since the results relative to student-oriented, formative assessment and teacher-directed instruction are clearly contradictory to the solid previous evidence. The data does not allow us to explain this paradoxical result. Future studies must consider the complexity of the measured variables as well as the students' perception and understanding of them.

The question that preset is whether and how big international data (like TIMSS and PISA) can be used by local and school-level decision-makers.

1.7 Rationale

The UAE is a relatively rapid developing country, located on the Arabian Peninsula in Asia on a land area equal to 83,600 square kilometers (World Bank, 2013). Seven emirates form the UAE with Abu Dhabi as the capital. The other emirates are Dubai, Sharjah, Ajman, Umm Al Quwain, Ras Al Khaimah and Fujairah (Gaad et al., 2006). The UAE was declared in 1971 when six emirates joined to make the federation, and Ras Al Khaimah joined in 1972. The population of the UAE is about 9.35 million, with 21% nationals (World Bank, 2013). The Federal National Council represents the legislative authority, and the Cabinet of Ministers represents the executive (UAE Report on Sustainable Development, 2002).

The UAE is striving to reach excellence in many sectors including its economy, industry, finance and education (Gaad et al., 2006). The government agenda (UAE Vision, 2021) calls for six national priorities, as follows:

(1) Cohesive society and preserved identity;

(2) Safe public and fair judiciary;

(3) Competitive knowledge economy;

(4) First-rate education system;

(5) World-class healthcare; and

(6) Sustainable environment and infrastructure.

First-rate education priority is concerned with education in the UAE. The UAE Vision (2021) requires all Emiratis to have equal opportunity and access to first-rate education that allows them to develop into well-rounded individuals, enhance their educational attainment, and achieve their true potential, contributing positively to society and education will provide equality of opportunity and balanced outcomes for all students.

UAE has residents from at least 180 nationalities from all over the world comprising 79% of the total population. KHDA (2016) mentioned that UAE education system is divided into two

groups: public schools and private schools. The number of private schools in Dubai for example is around 185 with 17 different curricula with a round 265,000 students in these schools. A round ten new private schools open each year, and their numbers are more than the number of public schools.

Gaad et al. (2006) explained the UAE education vision for 2021 that, although the UAE has achieved much in the field of education, there is a real awareness that constant updating of policy and continual investment in infrastructure is required to ensure that graduates are properly equipped to enter the workforce and assist in the country's development. In 2016 the UAE Ministry of Education had produced a policy document related to the Vision 2021 outlining a strategy for further educational development, which is based on realizing the importance of continuous improvement consistent with changing conditions both within the educational system and the needs of the society.

KHDA/DSIB has the most rigorous and extensive information about the progress of private schools in Dubai towards achieving the National Agenda targets, through the implementation of the National Agenda Parameter (NAPm) initiative from the academic year 2015-2016 until now. The scope of this research was restricted to the National Agenda Parameter implemented at selected samples of private schools in Dubai. A literature review was conducted to identify similar research using several databases; however, limited relevant literature could be found. The KHDA's (2016) 'Capacity to Grow report' mentioned that Dubai has one of the most varied populations of cities in the world; in line with its economic growth it has witnessed consistent growth in what has become a truly unique educational sector; that 90% of students are educated in Dubai's private system, with 17 different curricula are offered in these schools. These schools are catering to the great diversity in nationalities, culture and ethnicities of the Dubai's residents. The growth of Dubai's population has fueled an exponential increase in the supply of schools.

The first private schools in Dubai were established to serve early expatriate communities in the 1950s. Today, 90% of school students in Dubai attend private schools. In addition, Dubai's 185 private schools cater to more than half of all Emirati students. Student enrolment at private schools in Dubai has doubled over the past decade. This compound annual growth rate of 7.2% is consistently higher than annual GDP growth. When Dubai's economy shrank in the economic downturn of 2008/09, student enrolment continued to grow, demonstrating the sector's resilience in the face of changeable economic conditions. Over the past five years, growth in student enrolment has matched the consistency of growth in the Dubai economy. Slightly lower enrolment growth over the past two years is the result of an increase in the admission age for students starting school. Putting this change aside, annual growth in student enrolment nears 6% in each of the past two years. Dubai has far more students in earlier years of education, as would be expected from a population that is growing. There are more than twice as many students in Grade 1 as there are in Grade 11, due to the influx of new students in earlier years. In general, the number of students in a specific cohort remains relatively constant over time, so that the number of students in Grade 1 will be approximately the same as the number of students in Grade 6 five years later. While new schools will naturally target younger students to boost enrolment numbers, they must also adapt their grade-level mix in later years to cater to their more senior students.

KHDA's (2012) 'Dubai PISA 2012' report mentioned that an example of these international assessment test is PISA. The value of PISA lies beyond the mere assessment of student proficiency as it additionally collects valuable background information. Every participating student completes an anonymous background questionnaire alongside the assessment, providing information on their home environment, their attitudes towards learning and various aspects related to their education experience. Analysis of these data provides insight into the

factors that might influence the development of skills and attitudes at home and school. Coupled with proficiency data, it can be used by policy-makers to establish benchmarks for educational improvement as well as determine the impact of major initiatives or policies. This is the main reason why it has become the primary instrument for evaluating relative strengths and weaknesses of education systems. PISA has been shown to be a significant indicator of students' likelihoods to continue on to post-secondary education. Evidence from recent studies, in countries such as Australia, Canada and Denmark, finds a strong relationship between reading in PISA 2000 at age 15 and the probability that a student completes high school and continues to post-secondary studies by age 19. Other similar studies have mapped these outcomes to the developmental impact they have on an entire economy's growth as a result.

KHDA's (2012) 'Dubai and PIRLS 2011' report mentioned that international research that utilises common methodologies and data collection instruments enhances the understanding of successful education policy and practice. Policy-makers use this evidence, along with the benefit of their local institutional insight, to compare policy options, resulting in informed and improved decisions. Since its foundation in 2007, the KHDA in Dubai, has actively embraced the integration of evidence-based decision-making in policy formulation and dialogue with schools through a combination of quantitative and qualitative evidence. Participating in international assessments has been an important step for KHDA with substantial benefits that can be seen throughout the school system. Motivated by the value of gauging what students in Dubai could do in comparison to their peers regionally and internationally, decision-makers have ensured Dubai is now a participant in all major international assessments. This is underpinned by an understanding that the benchmark for success can no longer solely be measured by national standards; rather on what students achieve and how education systems perform on an internationally comparable scale. The first international assessment in which

Dubai participated was TIMSS in 2007. Results of TIMSS 2007 for Grade 4 and Grade 8 students formed initial baseline data about the performance of students in Dubai, and clearly indicated key data regarding the wide range of quality provided in Dubai's schools. Following TIMSS 2007, Dubai's 15-year-old students participated in PISA 2009. Dubai pioneered national involvement in both international assessments as a benchmarking participant in 2007. In order to get a detailed view of the skills possessed by the various groups within the Emirate, Dubai tested a large number of students to draw a representative picture of performance among all students in the relevant grade levels.

1.8 Assumptions

The main assumptions of this study were:

-The selected sample for this research should have the same test results for the two rounds with the inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018.The researcher assumed that the above condition is taken into consideration when selecting the school results and the inspection report for the three academic years.

- The data collected to be analysed by the mixed methods approach was valid and reliable. As for the TIMSS 2011 and 2015, PISA 2012 and 2015 and PBTS 2017 results, these were collected by the researcher as a secondary source from the data center of international assessment section of the DSIB/KHDA, hence the researcher assumed that these results are valid, reliable and credible.

- The National Agenda text from the inspection reports over the years 2015-2016, 2016-2017 and 2017-2018 was collected from the KHDA website from each school inspection reports. The researcher assumed that the collected reports were the correct one for each school and for the right academic year.

- The researcher assumed that the Principals participating in answering the survey questions did the best of their ability to provide credible and dependable data describing what they believed to be true, without bias. This assumption was justified since the participants were accredited professionals with an interest in the outcomes of this study; nevertheless, it is possible that data could be contaminated by response bias, because not all respondents necessarily report the truth when responding to survey questions (Paulhus, 1991).

1.9 Organisation of the Thesis Chapters

The current study is organised in six chapters. Chapter one gives the introduction of the study, including a background on education in the UAE and Dubai, the research problem and the research questions. Chapter two gives the theoretical framework and the literature review in addition to the conceptual framework. Chapter three describes and justifies the use of a mixed methods approach in the methodology chapter. Chapter four presents the results of the study. The research findings are discussed in Chapter five. Chapter six includes the conclusion in addition to the recommendations for future work on this research.

1.10 Chapter Summary

This chapter started with a general introduction about this research, followed by a background section and then a definition of the key concept terms. Statement of the research problem was explained followed by the purpose of the study and the research main questions. The significance of the study was explained and them the research rational and then finally the research assumptions are discussed.

CHAPTER 2: Theoretical Framework and Literature Review

2.1 Overview

In this chapter, the researcher will discuss the conceptual framework developed for this research; followed by a discussion of the theoretical framework with examples of theories related to educational reform and how they could be linked to the research main idea. Finally, the chapter will present literature related to international assessment, globalisation and the use of PISA, TIMSS and PBTS in education change.

2.2 Conceptual Framework

In this section the researcher will link the research main issue to a proposed conceptual framework to explain the relationship of the results of global international assessments such as PISA, TIMSS and PBTS with educational policy change of the school practices, in: the effective use of teaching strategies, the modification of curriculum, the enhancement of the students learning skills and finally the improvement of the used resources in the school.

2.2.1 Globalisation and International assessment

Dale (2000) suggested two kinds of approaches for the effect of globalisation on educational policies;

1- John Meyer and colleagues at Stanford University, develop the first globalisation approach, which is 'Common World Educational Culture (CWEC)'; in which they argue that the development of national educational systems and curricular categories are to be explained by universal models of education, state and society, rather than by distinctive national factors.

2- The other approach that was developed by Dale (2000) is the 'Global Structured Agenda for Education (GSAE)'; it draws on recent work on international political economy that sees the changing nature of the world capitalist economy as the driving force of globalisation and seeks to establish its effects on education systems.

Dale concluded that, the GSAE could explain and take into account the CWEC approach. This is because it adopted the position that capitalism is extremely flexible in terms of the institutional arrangements through which it can operate, and because there is a clear similarity between capitalism and the characteristic features of the hypothesized world culture; however the same is not true in the other direction. Dale (2000) defined 'globalization' as variously taken: as representing an ineluctable progress towards cultural homogeneity; as a set of forces that are making nation-states obsolete and that may result in something like a world polity; and as reflecting the irresistible growth of information technology. This will involve three things:

1- Appreciating and specifying the nature and force of the extranational effect.
2- Specifying what it is that may be affected in the case of education.
3- What forms those changes may take and how that effect occurs, whether directly or indirectly.

Smith (2014) mentioned that in the past two decades, there has been a complete shift in test characteristics and aims for many countries. To ensure better quality education, the global expansion of universal basic education has included accountability measures in the form of academic tests.

Williamson (2013) reviewed some of the key ideas about globalisation that now routinely influence educational policy-making and explored how the new global policy-speak of the global knowledge economy, global networks and new technology has begun to affect ideas about curriculum policy. He used the term 'global.edu' to refer to the contemporary saturation of policy with the language and imagery of global networks. Global.edu captures issues such as the intensification of the language of business in education policy, the participation of networks of diverse 'outsiders' in making education policy, the problems facing high-skills 'perma-

Temps' the 'learnification' of the educational policy vocabulary, and the global rise of 'policy as numbers'. In this context of global.edu, some recent and emerging examples of new curriculum projects have been explored briefly to illustrate what the future of the curriculum might look like. Globally, curriculum policy is being made to reflect the perceived need to cultivate the soft skills, generic competences and learning capacities associated with a technologically saturated knowledge economy, and it is being done not just by governments and their education systems but also by a much wider range of commercial and charitable providers.

Stacey et al (2018) mentioned that globalisation is a powerful process that exerts an increasing influence on many aspects of society. The impact of globalisation theory on education, and more particularly its impact on the curriculum, is an interesting topic for research, but depends on acquiring comparable data on school curricula from sufficient numbers of countries. The IEAs had collected data from TIMSS tests on mathematics and science curricula of participating countries since the 1990s that enables investigation of the national content of science and mathematics curricula over time. Existing research had tended to focus on mathematics curricula. TIMSS asks specific questions about the intended curricula, and while the intended curriculum is not necessarily to implement or achieve, it had a strong influence on the implemented and achieved curricula of an education system. Many other factors including local cultural influences may also have contributed; the influence of the international large-scale assessments themselves may lead to countries adopting education reforms and policies that have a successful implementation by high-performing jurisdictions. Understanding whether and why there have been identifiable global changes resulting in assumed international core curricula may reveal which strategies and topics countries have recognised as supporting future skills and knowledge.

Lewis and Lingard (2015) mentioned that Ball (2012) contends that there was a need for a new approach to education policy analysis, which is global education. Smith (2014) clarified that many countries shifting towards testing for accountability was a recent phenomenon, started first in the United States and then the United Kingdom.

Rutkowski and Rutkowski (2009) mentioned following on Dale's (2000) argument when studying TIMSS results, meaning that what students know based on curriculum is one type of outcome for which an increase in similarity across countries may be expected. That suggests extra-national forces may be rapidly harmonising educational outcomes; however, the form that harmonising may take provides support for either the CWEC or the GASE theory. This means that if Dale's three hypothesised regions emerge, it may be that capitalism is a more powerful force than international organisations with respect to the influence of global processes on education. Alternatively, finding that countries generally grow similar over time in terms of educational outcomes, institutional influences may be more dominant.

Salzer and Roczen (2018) mentioned that developing global competence is increasingly important, as learning, working and living environments become ever more global, interconnected and interdependent. Such development is essential for many people in the world, at present, and will be for all young people going forward. Young people will encounter, actively engage with and help shape those environments during their lifetime no matter where they are born and educated, work and live. Given this context, young people need to leave school equipped with the requisite knowledge, skills and attitudes that contribute to global competence and that they can develop further as they move through life, enabling them to learn, work and live in a globalised world. Students need to leave equipped with:

- a knowledge of and interest in engaging with the world around them;
- a growing confidence, flexibility and resilience, spirit of curiosity and adventure; and

- the communication and interaction skills necessary to make the most of the opportunities and challenges that fast-changing, interconnected and interdependent environments bring.

For this to happen, educators (school leaders, teachers and support staff) as well as those who develop education policy need to set education and educational learning experiences more firmly within a global context. They need to provide opportunities for young people:

- to learn about global developments, challenges and trends of significance to the world and to their lives;
- to experience classrooms and schools that foster the value of and embrace the diversity of peoples, languages and cultures, encouraging increasing intercultural sensitivity, developing and moving beyond tolerance to acceptance, respect and appreciation, moving from ethnocentric to ethnorelative world views; and
- to engage in experiences that facilitate international and intercultural relations, exchanges and conversations and encourage reflection upon and understanding of the learning outcomes from such experiences.

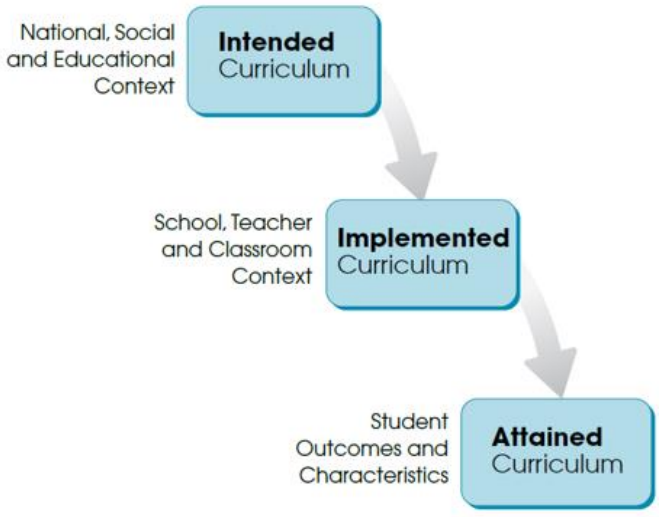
2.2.2 TIMSS assessment framework

Gronmo et al. (2015) mentioned that preparing students to excel in mathematics and science is one of the fundamental education goals in countries around the world. Studying mathematics and science during students' early years of schooling prepares them to succeed in education in the future and eventually in their daily life and the workforce. Effective participation in society increasingly requires understanding of mathematics and science to make informed decisions about personal health and finance, as well as about public policy concerning such issues as the environment and economy. Because of the educational importance of mathematics and science, IEA's Trends in International Mathematics and Science Study, widely known as TIMSS, is

dedicated to providing countries with information to improve teaching and learning in these curriculum areas. Conducted every four years on a regular cycle, TIMSS assesses achievement in mathematics and science at the fourth and eighth grades. The achievement data is collected together with extensive background information about the availability of school resources and the quality of curriculum and instruction. TIMSS provides countries with an unprecedented opportunity to measure progress in educational achievement in mathematics and science, together with empirical information about the contexts for schooling. As a project of the International Association for the Evaluation of Educational Achievement (IEA), TIMSS has the benefit of drawing on the cooperative expertise provided by representatives from countries all around the world. The IEA is an independent international cooperative of national research institutions and government agencies that has been conducting studies of cross-national achievement since 1959. As of 2009, IEA had 68 institutional members. The TIMSS 2011 assessment frameworks contain three frameworks and explain the assessment design that will serve as the basis for implementing TIMSS 2011. The TIMSS 2011 mathematics framework and the TIMSS 2011 science framework content cognitive domains in mathematics and science to be tested at the fourth and eighth grades. The content domains (for example, algebra, geometry, etc. in mathematics, and biology, chemistry, etc. in science) and the topic areas within the domains are described separately for the fourth and eighth grades with each topic area elaborated with specific objectives. The cognitive domains describing the thinking students should be doing within the mathematics and science content domains are the same for mathematics and science and parallel across grades, but with different levels of emphasis. The TIMSS 2011 Contextual Framework describing the types of situations and factors associated with students' learning in mathematics and science was investigated via the questionnaires. Hence, it provided an overview of the TIMSS 2011 assessment design, including general

parameters for item development. Building on earlier IEA studies of mathematics and science achievement, TIMSS uses the curriculum, broadly defined, as the major organising concept in considering how educational opportunities are provided to students, and the factors that influence how students use these opportunities. The TIMSS curriculum model has three aspects: the intended curriculum, the implemented curriculum, and the achieved curriculum; see Figure 2.1. These represent respectively, the mathematics and science that society intends students to learn and how the education system should be organised to facilitate this learning; what is actually taught in classrooms, the characteristics of those teaching it, and how it is taught; and, finally, what it is that students have learned, and what they think about these subjects. Working from this model, TIMSS uses mathematics and science achievement tests to describe student learning in the participating countries, together with the TIMSS encyclopedia and questionnaires, to provide extensive information about students' opportunity to learn.

Figure 2 1 TIMSS Curriculum Model



TIMSS asks countries to provide information about the level of mathematics and science students are expected to learn via the TIMSS encyclopedia and the curriculum questionnaires.

For example, the TIMSS 2007 encyclopedia (Mullis, Martin, Olson, Berger, Milne, & Stanco, 2008) provided information from the countries participating in TIMSS 2007 about their national contexts for mathematics and science education as well as descriptions of their mathematics and science curricula.

The qualitative information provided in the TIMSS 2007 encyclopedia complements both the TIMSS 2007 international mathematics report and the TIMSS 2007 international science report. The international reports contain extensive questionnaire data about the structure and rigour of the intended curriculum in mathematics and the efforts extended to help students actually learn the curriculum. For example, the questionnaire data includes: teachers' reports about their preparation, experience, and attitudes; the mathematics and science content actually taught to the students assessed for TIMSS; the instructional approaches used in teaching mathematics and science; and the resources available in classrooms and schools to support mathematics and science teaching and learning. The TIMSS assessment frameworks for 2011 were updated from those used in the TIMSS 2007 Assessment Frameworks (Mullis, Martin, Ruddock, O'Sullivan, Arora, & Erberber, 2005). Updating the frameworks regularly provides participating countries greater opportunity to review and provide information about the frameworks and results more coherently from assessment to assessment, permitting the frameworks, the instruments, and the procedures to evolve gradually into the future. For TIMSS 2011, the frameworks were discussed by representatives of the participating countries. The questionnaires attempted to garner each country's views about adding or deleting particular assessment topic areas and objectives. The TIMSS 2011 Assessment Frameworks document closely resembles that for TIMSS 2007. Since it is crucial to have continuity in a study designed to measure trends in educational achievement over time, this is very appropriate. However, there are some notable revisions. In the discussions about updating the frameworks as well as by the IEA and TIMSS management and technical

groups, the emphasis has been on improving the quality of measurement in the assessments for TIMSS 2011 and on increasing the utility of results for participating countries. This includes the following: assessing content appropriate to the students and important for their future lives; ensuring adequate response time for students; increasing operational feasibility; and maximising the potential to improve reporting achievement in the content and cognitive domains assessed.

TIMSS provides valuable information that helps countries monitor and evaluate their mathematics and science teaching across time and across grades. By participating in TIMSS, countries can:

- Have comprehensive and internationally comparable data about what mathematics and science concepts, processes, and attitudes students have learned, by the fourth and eighth grades.
- Assess progress internationally in mathematics and science learning across time for students at the fourth grade and for students at the eighth grade.
- Identify aspects of growth in mathematical and scientific knowledge and skills from fourth grade to eighth grade.
- Monitor the relative effectiveness of teaching and learning at the fourth as compared to the eighth grade, since the cohort of fourth grade students is assessed again as eighth graders.
- Understand the contexts in which students learn best. TIMSS enables international comparisons among the key policy variables in curriculum, instruction, and resources that result in higher levels of student achievement.
- Use TIMSS to address internal policy issues. Within countries, for example, TIMSS provides an opportunity to examine the performance of population subgroups and

address equity concerns. It is efficient for countries to add questions of national importance as part of their data collection effort.

2.2.3 PISA assessment framework

OECD (2013) mentioned that it launched the Programme for International Student Assessment (PISA) in 1997. PISA represents a commitment by governments to monitor the outcomes of education systems by measuring student achievement on a regular basis and within an internationally agreed common framework. It aims to provide a new basis for policy dialogue and for collaboration in defining and implementing educational goals, in innovative ways that reflect judgments about the skills that are relevant to adult life. PISA is a collaborative effort undertaken by its participants to measure how well students, at age 15, are prepared to meet the challenges they may encounter in future life. Age 15 is chosen because at this age, students are approaching the end of compulsory education in most OECD countries. PISA, jointly guided by the participating governments, brings together the policy interests of countries with scientific expertise at both national and international levels. PISA has been measuring the knowledge, skills and attitudes of 15-year-olds over the last 12 years from Dubai's first participation in PISA in 2007 and is therefore able to give some insight into how countries are faring over time. The PISA assessment takes a broad approach to measuring knowledge, skills and attitudes that reflect current changes in school priorities, moving beyond the school-based approach towards the use of knowledge in tasks and challenges likely to be encountered in home and work life outside of the school. It is based on a dynamic model of lifelong learning in which new knowledge and skills necessary for successful adaptation to a changing world are continuously acquired throughout life. The assessment is informed by the common denominator of national curricula. Thus, while it does assess students' knowledge, PISA also examines their ability to reflect and to apply their knowledge and experience to real-life issues in a reflective way. For

example, in order to understand and evaluate scientific advice on food safety, an adult would need not only to know some basic facts about the composition of nutrients, but also to be able to apply that information. The term 'literacy' is used to encapsulate this broader concept of knowledge and skills. The PISA assessment aims to determine the extent to which 15-year-old students can activate various cognitive processes that would enable them to make effective use of the reading, mathematical and scientific knowledge and skills they have acquired throughout their schooling and related learning experiences up to that point. PISA is designed to collect information through three-yearly assessments and presents data on domain-specific knowledge and skills in reading, mathematics and science of students, schools and countries. It combines the assessment of reading, mathematics and science with information on students' home background, their approaches to learning, their learning environments and their familiarity with computers. Thereby, PISA provides insights into the factors that influence the development of skills and attitudes, at home and at school, and examines how these factors interact and what the implications are for policy development. PISA uses:

- strong quality assurance mechanisms for translation, sampling and test administration;
- measures to achieve cultural and linguistic breadth in the assessment materials, particularly through countries' participation in the development and revision processes for the production of the questions; and
- state-of-the-art technology and methodology for data handling.

The combination of these measures produces high quality instruments and outcomes with superior levels of validity and reliability to improve the understanding of education systems as well as students' knowledge, skills and attitudes.

The theory underlying the PISA 2012 assessment, including a re-developed and expanded framework for mathematical literacy, incorporates processes in which students engage when

they solve problems as a new reporting dimension. It includes also a new optional computer-based assessment of mathematics (CBAM), reflecting the importance of Information and Communication Technologies (ICTs) for working mathematically in modern societies. It also provides the basis for the assessment of reading and science. Within each domain, the knowledge content that students need to acquire is outlined, as well as the processes that need to be performed and the contexts in which knowledge and skills are applied. It also illustrates the domains and their aspects with sample tasks. Finally, the theory underlying the context of the questionnaires is presented. The questionnaires are used to gather information from students, schools and parents, on the students' home background and attitudes, their learning histories and their learning environments at school.

PISA results allow national policy makers to compare the performance of their education systems with those of other countries. Similar to the previous assessments, the 2012 assessment covers reading, mathematics and science, with the major focus on mathematical literacy. Students also respond to a background questionnaire, and additional supporting information is gathered from the school authorities. Sixty-six countries and economies, including all 34 OECD member countries took part in the PISA 2012 assessment.

Since the aim of PISA is to assess the cumulative yield of education systems at an age where compulsory schooling is still largely universal, testing focuses on 15-year-olds enrolled in both school-based and work-based educational programmes. Between 4500 and 10000 students from at least 150 schools are typically tested in each country, providing a good sampling base from which to break down the results according to a range of student characteristics.

The assessment of cross-curricular competencies continues to be an integral part of PISA 2012. The main reasons for this broadly oriented approach are:

- Although specific knowledge acquisition is important in school learning, the application of that knowledge in adult life depends crucially on the acquisition of broader concepts and skills. In reading, the capacity to develop interpretations of written material and to reflect on the content and qualities of text are central skills. In mathematics, the ability to answer familiar textbook questions must be supplemented by being able to reason quantitatively, to represent relationships or dependencies, and to connect the context and structure of a problem with mathematics when it comes to deploying mathematical skills in real world problems. In science, having specific knowledge, such as the names of plants and animals, is of less value than understanding broad topics such as energy consumption, biodiversity and human health in thinking about the issues under debate in the adult community.
- In an international setting, a focus on curriculum content would restrict attention to curriculum elements common to all or most countries. This would force many compromises and result in an assessment too narrow to be of value for governments wishing to learn about the strengths and innovations in the education systems of other countries.
- Certain broad, general skills are essential for students to develop. They include communication, adaptability, flexibility, problem solving and the use of information technologies. These skills are developed across the curriculum and an assessment of them requires a broad cross-curricular focus.

PISA is not the only cross-national assessment of the reading, mathematics and science skills of 15-year-old students. An ongoing programme will lead to the development of a body of information for monitoring trends in the knowledge and skills of students in various countries as well as in different demographic subgroups of each country. On each occasion, one domain

is tested in detail, taking up nearly two-thirds of the total testing time. This data collection strategy provides a thorough analysis of achievement in each area every nine years and a trend analysis every three. The major domain was reading in 2000 and 2009, mathematics in 2003 and science in 2006. In 2012, it was mathematics again and in 2015 it was science, building on a modified mathematics framework, which incorporates the computer-based assessment of mathematics and includes the mathematical processes, which students undertake when using mathematical literacy, and the fundamental mathematical capabilities, which underlie those processes. The reading and science frameworks for PISA 2012 were the same as for the previous assessment.

The PISA assessment provides three main types of outcomes:

- Basic indicators that provide a baseline profile of the knowledge and skills of students.
- Indicators derived from the contextual questionnaire that show how such skills relate to important demographic, social, economic and educational variables.
- Indicators on trends that emerge from the on-going nature of the data collection and that show changes in outcome levels and distributions, and in relationships between student-level and school-level background variables and outcomes.

Although indicators are an adequate means of drawing attention to important issues, they do not provide answers to policy questions. Therefore, PISA has also developed a policy-oriented analysis plan that goes beyond the reporting of indicators.

PISA focuses on young people's ability to use their knowledge and skills to meet real-life challenges. This orientation reflects a change in the goals and objectives of curricula themselves, which are increasingly concerned with what students can do with what they learn at school and not only with whether they have mastered specific curricular content.

Key features driving the development of PISA have been its:

- Policy orientation, which connects data on student learning outcomes with data on students' characteristics and on key factors shaping their learning inside and outside school in order to draw attention to differences in performance patterns and to identify the characteristics of schools and education systems that have high performance standards.
- Innovative 'literacy' concept, which is concerned with the capacity of students to apply knowledge and skills in key subject areas and to analyse, reason and communicate effectively as they pose, solve and interpret problems in a variety of situations.
- Relevance to lifelong learning, which does not limit PISA to assessing students' curricular and cross-curricular competencies, but also asks them to report on their own motivation to learn, their beliefs about themselves and their learning strategies.
- Regularity, which enables countries to monitor their progress in meeting key learning objectives.
- Breadth of geographical coverage and collaborative nature, which in PISA 2012 encompasses the 34 OECD member countries and over 30 partner countries and economies.

The relevance of the knowledge and skills measured by PISA is confirmed by recent studies tracking young people in the years after they have been assessed by PISA. Studies in Australia, Canada and Denmark display a strong relationship between the performance in reading in the PISA 2000 assessment at age 15 and the chance of a student completing secondary school and of carrying on with post-secondary studies at age 19. For example, Canadian students who had achieved reading proficiency Level 5 at age 15 were 16 times more likely to be enrolled in post-secondary studies when they were 19 years old than those who had not reached the reading proficiency Level 1.

PISA is the most comprehensive and rigorous international programme to assess student performance and to collect data on the student, family and institutional factors that can help to explain differences in performance. Decisions about the scope and nature of the assessments and the background information to be collected are made by leading experts in participating countries, and are steered jointly by governments based on shared, policy-driven interests. Substantial efforts and resources are devoted to achieving cultural and linguistic breadth and balance in the assessment materials.

Stringent quality assurance mechanisms are applied in translation, sampling and data collection. As a consequence, the results of PISA have a high degree of validity and reliability, and can significantly improve understanding of the outcomes of education in the world's economically most developed countries, as well as in a growing number of countries at earlier stages of economic development.

Across the world, policy-makers are using PISA findings to:

- gauge the knowledge and skills of students in their own country in comparison with those of the other participating countries;
- establish benchmarks for educational improvement, for example, in terms of the mean scores achieved by other countries or their capacity to provide high levels of equity in educational outcomes and opportunities; and
- understand the relative strengths and weaknesses of their education systems.

The interest in PISA is illustrated by the many reports produced in participating countries, the numerous references to the results of PISA in public debates and the intense media attention shown to PISA throughout the world.

The three domains assessed in PISA 2012 were math literacy, scientific literacy and reading literacy. The domain definitions all emphasise functional knowledge and skills that allow one

to participate actively in society. Such participation requires more than just being able to carry out tasks imposed externally by, for example, an employer it also means being equipped to take part in decision-making processes. In the more complex tasks in PISA, students are asked to reflect on and evaluate material, not just to answer questions that have single correct answers. The definitions address the capacity of students to extrapolate from what they have learnt, and to apply their knowledge in novel settings. The definitions also focus on the students' capacity to analyse, reason and communicate effectively, as they pose, solve and interpret problems in a variety of situations.

1- Mathematical literacy: An individual's capacity to formulate, employ, and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to recognise the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens.
2- Reading literacy: An individual's capacity to understand, use, reflect on and engage with texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.
3- Scientific literacy: An individual's scientific knowledge and use of that knowledge to identify questions to acquire new knowledge, to explain scientific phenomena, and to draw evidence-based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and inquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen.

While the main benefit of constructing and validating a framework for each of the domains is improved measurement, there are other potential benefits:

- A framework provides a common language and a vehicle for discussing the purpose of the assessment and what it is trying to measure. Such a discussion encourages the development of a consensus around the framework and the measurement goals.
- An analysis of the kinds of knowledge and skills associated with successful performance provides a basis for establishing standards or levels of proficiency. As the understanding of what is being measured and the ability to interpret scores along a particular scale evolves, an empirical basis for communicating a richer body of information to various constituencies can be developed.
- Identifying and understanding particular variables that underlie successful performance furthers the ability to evaluate what is being measured and to make changes to the assessment over time.
- The understanding of what is being measured and its connection to what we say about students provides an important link between public policy, assessment and research, which, in turn, enhances the usefulness of the data collected.

2.2.4 PISA Base Test for Schools assessment framework

OECD (2017) mentioned that the PISA-Based Test for Schools (PBTS) is a student assessment tool geared for use by schools and networks of schools to support research, international benchmarking and school improvement efforts. In the United States, the assessment is known as the OECD Test for Schools (based on PISA). The assessment tool provides descriptive information and analysis on the skills and creative application of knowledge of 15-year-old students in reading, mathematics, and science, comparable to existing PISA scales. The assessment also provides information on how different factors both within and outside school

associate with student performance. Contextual questionnaires geared for students and schools are an important part of the assessment. Information about students' socio-economic backgrounds, their attitudes and interests in reading, science and mathematics and the learning environment at school are all addressed in the assessment.

The PBTS provides important peer-to-peer learning opportunities for educators – locally, nationally and internationally – as well as the opportunity to share good practices to help identify 'what works' to improve learning and build better skills for better lives.

The OECD completed the international pilot trial of the assessment in March 2013. Since 2010 and under the guidance of the PISA Governing Board (PGB), the OECD has carried out the development of the assessment and the implementation of the pilot in collaboration with schools and local partners in different countries. The organisational and technical characteristics of the PBTS involve a number of different aspects:

- The design of the test and the features incorporated into the test developed for PBTS.
- The student sampling design, requirement and procedures.
- Because of the international nature of the test, rules and procedures required to guarantee the equivalence of the different language and cultural versions used within and between participating countries.
- Various operational procedures, including test administration arrangements, data capture and processing, and quality assurance mechanisms designed to ensure the generation of comparable data from all schools and countries.
- Scaling and analysis of the data and their subsequent reporting: PBTS employs scaling models based on Item Response Theory (IRT) methodologies. The described proficiency scales, which are the basic tool in reporting PBTS outcomes, are derived using IRT analysis.

- Procedures for automating the production of school reports presenting schools' results at PBTS.

The PBTS is coordinated in each country by an accredited National Service Provider who implements the procedures that were prepared and agreed upon with the OECD. The PBTS pilot stage report has been developed for National Service Providers to acquaint themselves with the PBTS design and with the procedures required to correctly implement the PBTS, and generate and report back results to the participating schools. The National Service Provider is responsible for implementing the project within its own country. It:

- is in contact with the OECD and receives support in all aspects of the PBTS operational procedures;
- discusses nationally specific aspects of the implementation of the PBTS (such as national options regarding sampling, analysis and reporting);
- establishes procedures for the security and protection of the confidentiality of materials during all phases of the implementation;
- prepares the national versions of the test instruments, questionnaires, manuals and coding guides;
- conducts a field trial and analysis of the field trial data in order to assess and possibly improve the quality of the survey instruments;
- recruits the participating schools;
- identifies school coordinators from each of the participating schools (nominated by the school principal or a volunteer from the school staff) and works with them on school preparation activities;
- selects the student sample from a list of eligible students provided by the school coordinators;

- recruits and trains tests administrators according to the technical standards to administer the tests within schools;
- recruits and trains coders;
- arranges for the data entry of the test and questionnaire responses;
- processes school cognitive and context data according to the procedures described in this Technical Report and generating schools' results; and
- coordinates the reporting of individual school results and sends school reports back to the participating schools.

2.2.5 Conceptual Framework for this Research

Education is a particularly important focus of the UAE National Agenda 2021 which included eight objectives that should lead the UAE to being among the most successful countries in providing excellent education. These objectives target important areas in education related to students, teachers and school leaders. Two of the eight objectives, which private schools share with the public schools, are the responsibility with government schools to achieve:

1- In PISA (Programme for International Student Assessment) for UAE to be among the 20th highest performing countries.
2- In TIMSS (Trends in International Mathematics and Science study) for UAE to be among the 15th highest performing countries.

A National Agenda Parameter (NAPm) was introduced by the KHDA/DSIB to measure private schools progress towards achieving the National Agenda targets. NAPm is given for the schools in their yearly inspection report, stating whether the school has met or exceeded the requirement of the National Agenda targets, or if the school did not meet that requirement. The requirement consists of four main components, namely:

- teaching strategies the school is using

- the modified curriculum for the school
- the enhancement of the students learning skills and finally
- the improvement of the used resources in the school.

Verger et al. (2018) introduced the Global Education Reform Movement (GERM), which is expanding internationally and reaching countries that seemed to be immune to this education reform approach until quite recently. Accordingly, more and more educational systems across the world are articulated around three main policy principles: accountability, standards and decentralisation. National large-scale assessments (NLSAs) are a core component of the GERM; these assessments are increasingly used for accountability purposes as well as to ensure that schools achieve and promote centrally defined and evaluable learning standards. The researchers explored the trends on the basis of a new and original database on NLSAs, as well as on data coming from the PISA questionnaires. They will discuss how different theories on policy dissemination/globalisation explain the international spread of NLSAs and test-based accountability worldwide and reflect on the potential of a political sociology approach to analyse this globalising phenomenon.

Based on Dale's (2000) theory of globalisation 'Global Structured Agenda for Education' and the adaptation of PISA and TIMSS frameworks, the theoretical framework of this thesis was formulated based on the model in Figure 2.2. In this model, the PISA and TIMSS results will depend on the school's practices, which is an effect of one or more of the four different components, which are: teaching strategies, curriculum modifications, students' learning and school resources.

Figure 2.2 shows how the work of the schools based on this thesis framework can affect the school and students' outcomes, where consistent practices should be implemented over all the different components to make the required progress.

Figure 2.2 Consistent schools' practices of the TIMSS and PISA framework will lead to consistent outcomes

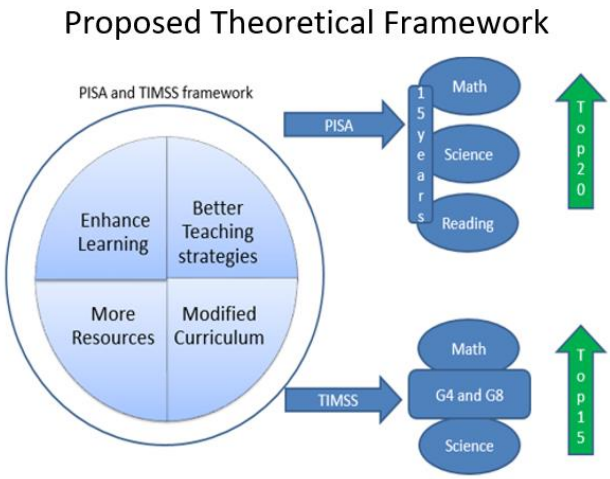
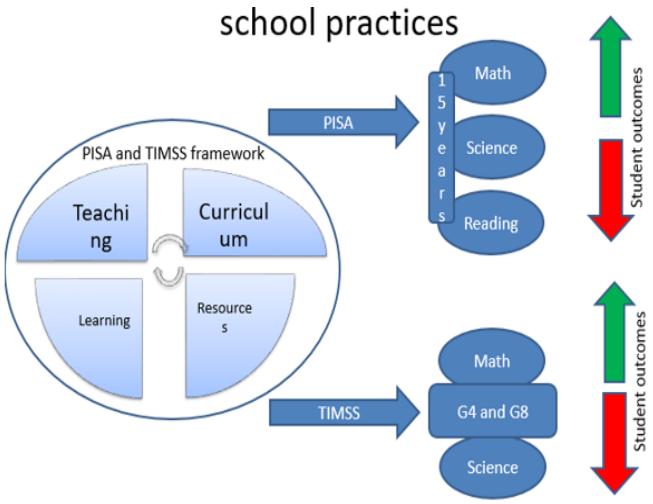


Figure 2.3 (below) shows the inconsistent approaches of the schools for the development of one or more of the above four components to improve schools progress towards achieving the National Agenda targets, which lead to the inconsistent effect and hence the inconsistent results in PISA and TIMSS results.

Figure 2.3 Inconsistent schools' practices of the PISA and TIMSS framework leads to inconsistent outcomes



Based on the researcher's knowledge, the proposed theoretical framework in Figure 2.2 is a new one that was proposed for this research. This proposed framework will explain the achievements of the private schools in Dubai towards the National Agenda targets depending on the continuous school practices of curriculum modification, teaching strategies for enhancing students' learning and enhancing resources in the schools for a better performance of students' learning.

2.3 Theoretical Framework

In this section, theoretical frameworks that are related to educational policy change will be reviewed. In addition, it will explain the effect of educational policy change on countries' achievements in international assessments such as PISA and TIMSS.

Figure 2 4 Theories related to this research theoretical framework

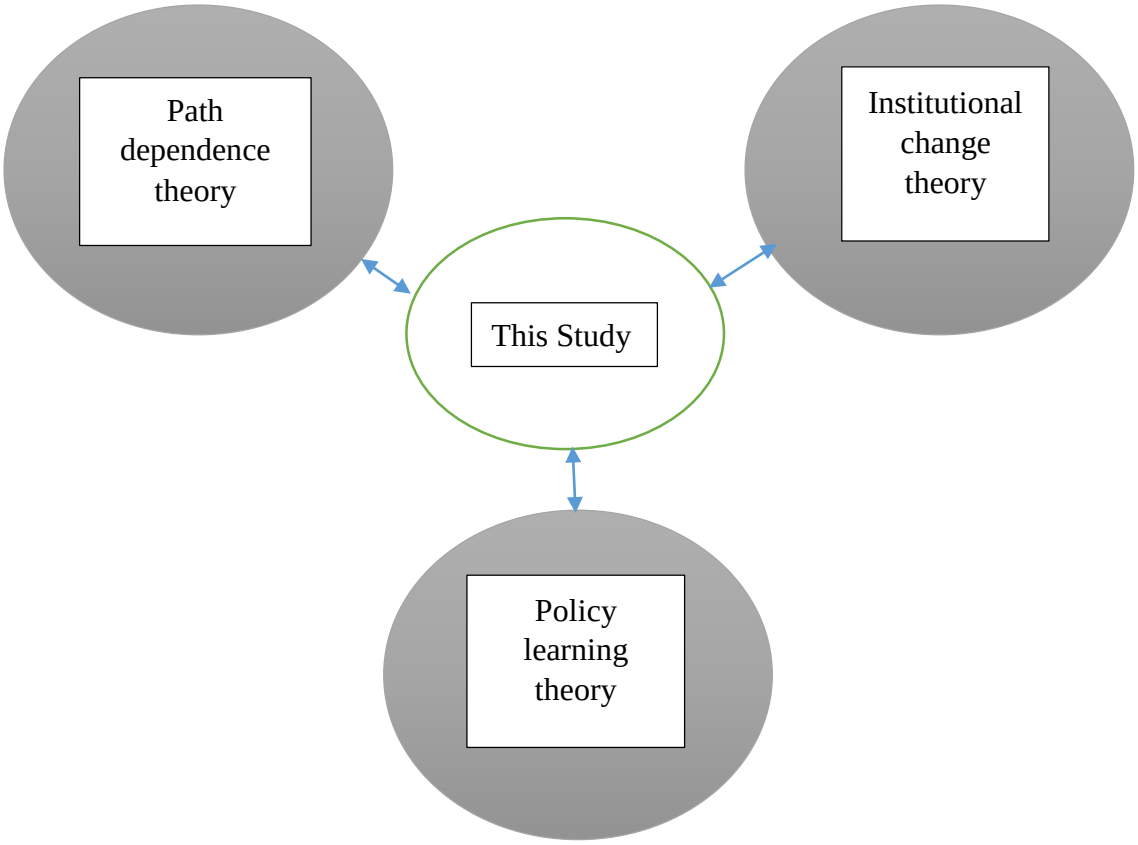


Figure 2.4 represent the correlation between the different theories and this study theoretical framework, the different theories are: Path dependence theory; Institutional change theory and the Policy learning theory. Each theory has its own strengths and weaknesses, and their applicability differs across policy areas as well as the extent of change. Theories should be able to generalise observations and have predictive power, but most of the presented theories are more able to explain change in the past rather than predict change in the future based on certain conditions. Therefore, it seems reasonable to mix and match convincing elements of the theories, depending on the policy area and context. The correlation between each of these theories and this study will be discussed in the following sections. A practical example on this theory implementation from literature is discussed by the end of each theory.

2.3.1 Path Dependence Theory

Cerna (2013) reviewed this theory and highlighted its strengths and weakness. The Path dependence theory, argues that it is generally difficult to change policies because institutions are sticky, and actors protect the existing model (Greener, 2002). Path dependence was defined by Levi (1997) to be the track the country or region had started on; the costs of reversal are very high. As Pierson (2000) noted public policies and formal institutions are usually designed to be difficult to change so past decisions encourage policy continuity. Hansen (2002) argued that path dependence is established only when it can be shown that policy change was considered and rejected for reasons that cannot be explained, without reference to the structure of costs and incentives created by the original policy choice. In addition, to introduce a major change, policy-makers have to wait for a critical juncture (Capoccia & Kelemen, 2007) or a window of exceptional opportunity called conjuncture (Wilsford, 1994).

The strengths of this theory are: the theory is able to explain why policy continuity is more likely than policy change and the theory remains difficult to change its path because actors and

policies have become institutionalized, which necessitates great efforts and costs by actors who desire change. On the other hand, the weakness of this theory are: that it is difficult to show the costs and incentives created by the original policy choice and how these affect decisions about future policy choices. In addition, critical junctures methodologically are a challenging task. This means that actors face a broader range of feasible options during a brief period of time, and their choices would likely have a significant impact on subsequent outcomes.

This theory is related to this study by ensuring that National Agenda Policy that was announced in UAE in 2014 was a continuity of the UAE vision 2021 for education that the country is aiming to achieve and to achieve this vision they country had to go through this Policy taking into account all the cost and efforts spent to ensure its achievement.

Whitley et al. (2014) explored the neo-institutional theory of global policy convergence, or 'isomorphism', by comparatively examining one of its most recent manifestations – the global diffusion of national standardised testing – in Australia and Japan. By understanding the particular configurations of national testing as being conditioned by both nations' institutional frameworks and historical legacies of education policy development, this study illuminates how the conditioning effects of these frameworks and legacies resulted in the divergent ways in which a policy model circulating at the transnational level became translated into assessment policies that are simultaneously similar and different. These findings are related to the concept of path dependency theory, emphasised in particular by political science and historical institutionalism. The theoretical conclusions drawn on this basis indicate a promising direction of comparative education research, one that recognises global convergence and national divergence as processes that simultaneously shape the globalisation of education policy.

2.3.2 Institutional Change Theory

Cerna (2013) reviewed this theory and highlighted its strengths and weakness. Streeck and Thelen (2005) have developed a useful typology for Institutional change theory. They mentioned that institutions have formalised rules that may be enforced by calling upon a third party. While institutional change is not necessarily the same as policy change, there are some instances when the two overlap. Theories of institutional change can be theories of policy change; Streeck and Thelen mentioned that policies stipulate rules that assign normatively backed rights and responsibilities to actors and provide for their public, that is third-party enforcement. Policies are institutions in the sense that as Streeck and Thelen defined them they constitute rules for actors other than for policy-makers themselves, rules that can and need to be implemented and that are legitimate in that they will if necessary be enforced by agents acting on behalf of society as a whole. First of all, Streeck and Thelen (2005) presented a typology of the results and processes of change, which indicate either an incremental or abrupt process of change. The result of change is divided into continuity or discontinuity. For instance, with incremental change and continuity, we would expect reproduction by adaptation, but when change is abrupt and there is discontinuity, we would expect breakdown and replacement of the institutions. Streeck and Thelen (2005) then introduce five different types of change: displacement, layering, drift, conversion, and exhaustion:

1- Displacement: the institutional configurations are vulnerable to change as traditional arrangements are discredited or pushed to the side in favour of new institutions and associated behavioural logics. Such change often occurs through rediscovery or activation and the cultivation of alternative institutional forms.

2- Layering involves active sponsorship of amendments, additions, or revisions to an existing set of institutions. Change takes place through differential growth: the introduction of new elements sets in motion dynamics through which over time they

actively crowd out or supplant the old system whose domain decreases relative to before.

3- Drift: institutions are subject to erosion or atrophy if they do not adapt to a changing political and economic environment. It can be caused by gaps in rules. Change can be promoted by political cultivation.

4- Conversion: institutions are redirected to new goals, functions or purposes in conversion. This might happen as a result of new environmental challenges or through changes in power relations, or it may occur through political contestation over what functions and purposes an existing institution should serve. There are often unintended consequences, and change involves compromise as actors exploit ambiguities and time matters for this type of change.

5- Lastly, exhaustion is a process which leads to breakdown, thus it differs from the other four processes of change. However, the collapse is gradual and not abrupt. Exhaustion can happen when the normal working of an institution undermines its external preconditions and there is an erosion of resources.

The strengths of this theory are: the theory is very influential in the literature and has been applied across a wide range of institutional and policy changes. It is highly sophisticated as it distinguishes different types of change, and impacts on the system. While, the weakness is that the theory of institutional change applies mainly to institutions, even though policies can be institutions in some instances, but in practical terms, it is not always clear when this is the case. This theory is related to this study since it relate different implementation of the National Agenda Policy through different institutions in the country such as KHDA/DSIB in the case of Dubai private schools and how these institutions uses different type of change to meet the National Agenda targets for each school through the different policies implemented.

Knodel et al (2013) focused on the effects of the most significant international initiative in secondary education, which is the Organisation for Economic Co-operation and Development's (OECD) Programme for International Student Assessment (PISA). They analysed two countries that provide variation regarding the degree of change in their respective education policy-making due to this study: while Germany substantially reformed its education system in reaction to its mediocre PISA results, almost no change has been observed in England. As they showed, alterations and shifts in ideas of education policy best account for such a change. Overall, there have not been any institutional changes in England in response to the country's scores in the PISA study. PISA did not bring about anything completely new due to a strong tradition of testing in English education. In contrast to many other European countries, the outcomes of the education system have continuously been assessed and monitored in England.

2.3.3 Policy Learning Theory

Cerna (2013) reviewed this theory and highlighted its strengths and weakness. Heclo (1974) defined policy learning theory to be relatively enduring alterations of thought or behavioural intentions which result from experience and which are concerned with the attainment of policy objectives. Policy learning is an important aspect of policy change and can alter secondary aspects of a coalition's belief system; changes in the main aspects of a policy usually result from shifts in external factors such as macro-economic conditions or the rise of a new systemic governing coalition (Sabatier 1988). Nonetheless, policy learning is a heterogeneous category. However, questions about who learns, what is learned and what effects on resulting policies emerge as a result of learning differ considerably across these types of learning (Bennett & Howlett, 1992). For instance, in policy-oriented learning, the agent of learning is the policy network, while learning is less about organisations than about ideas. In addition, learning is considered a process by which networks learn from past experiences, and thus is mostly about

techniques and processes in order to improve policy (Bennett & Howlett, 1992). As mentioned before, the innovative aspect of the advocacy coalition framework is to focus on policy-oriented learning: actors' desires to realise core values in a world of limited resources provides strong incentives to learn more about the saliency of problems, the factors affecting them and consequences for policy alternatives (Sabatier, 1988). But understanding the process of policy change and the role of policy-oriented learning requires a time perspective of a decade or more. The strengths of the theory are: it is part of several theories, and highlights that countries, regions and systems can change policies by learning from others and hence shifting their beliefs. It included three complex processes: learning about organisations, learning about programmes, and learning about policies. Thus they propose to differentiate between the three concepts of government learning, lesson-drawing and social learning. On the other hand, the weakness of the theory are: It has been difficult to operationalise and measure the concept of learning in general and by adding more categories does not necessarily lead to a better understanding of the concept.

This theory is related to this study since the National Agenda Policy is UAE policy across 8 different components where education is one of these components. This helped the country to look at the different process of learning about the organisation such as KHDA/DSIB, learning about the programme such as the National Agenda Policy method and learning about the policy such as the schools targets in TIMSS and PISA action plans.

Lingard (2010) provided a contextualised and critical policy analysis of the Rudd government's national schooling agenda in Australia. The specific focus is on the introduction of national literacy and numeracy testing and the recent creation by the Australian Curriculum, Assessment and Reporting Authority of the website 'My School', which lists the results of these tests for all Australian schools, including school performance against averages and against the performance

of 60 other socio-economically ‘likeschools’ across the nation. It is argued that we are seeing the emergence of a national system of schooling (including national curriculum) as part of the reconstitution of the nation in the face of globalisation and related economisation of education policy. This is the case despite Australia’s federal political structure, with each of the states holding the ostensible Constitutional responsibility for schooling. The analysis locates these and associated developments (a national schooling policy ensemble) within considerations of new accountabilities, the restructured state, neo-liberalism, globalised education policy discourses and policy borrowing and learning.

2.4 Literature Review

The main focus of this section was to identify and review knowledge and ideas related to the use of international assessments such as PISA, TIMSS and PBTS in effecting change or reform in educational policies in countries. This modification could include curriculum, teaching strategies, students’ learning skills and school resources.

2.4.1 International assessments and education reform

Boud (2018) stated that there is much discussion about the use of various instruments to measure learning gain, but we already have one that most people are familiar with in schools. It is called student assessment, which is to regularly judge students based on the work they produce. If learning gain is to be demonstrated anywhere, surely this is the first place to look. If those that mark assessments are not concerned with learning gain, what are they doing?

The challenge at the heart of the learning gain debate is that the most readily available measure of learning gain is existing data from student assessments. However, we cannot use assessment as it is practised currently because ironically it is not set up to inform us about student learning. If assessment was really a process of judging performance against learning outcomes within a

framework of declared standards, then there would not be a problem. The following are some common characteristics of assessment today (Boud, 2018):

- Marks for a given subject are not indicators of each learning outcome.
- Marks are aggregated across different learning outcomes, so that it is impossible to determine what outcomes final marks represent.
- Pass marks are typically set in arbitrary ways that are not justified in terms of threshold learning outcomes.
- Pass marks are determined within a disciplinary culture in relation to the internal features of the subject and its tasks; no calibration of pass marks in relation to agreed standards is typically undertaken across units.
- It is common for students who do well on some learning outcomes to be compensated for poor performance on others. This can allow them to pass the unit without attaining threshold level outcomes on all learning outcomes.
- Re-sits provide marks, which are hard to match with those in earlier tests. Should the first failing mark be used to judge learning gain, or the second successful one?
- The standards to reach a pass may be higher in later subjects than earlier ones.

MDRC (2010) suggested two theories to explain the underperforming of United States students in maths and science in grades four and eight. The Complexity theory applies to variables like initial conditions, distributed authority, control parameters, fractals and synergy. The second theory is called the Self-Determination theory and covers administrators internalizing the value of improved teaching and learning; such as valuing policies, structure, producers and behaviours implicit of reform.

Bonal and Trabini (2013) discussed how PISA results have played a key role in shaping Spanish hegemonic educational discourses, policies and practices, setting the framework of what is

thinkable and doable in education, using two main mechanisms that feature a regularly in national educational policy discourse – selectivity and instrumentalisation. Bonal and Trabini argue that it is crucial to consider the national education policy role against globalisation views, in order to understand why the same mechanism –standardisation through PISA- could have such a different impact according to the context. In this case, the socio-economic position of the country within the EU and high level of politicisation of PISA results are two critical variables that are necessary in order to understand both its direct and its indirect effects.

Rogers (2014) discussed the new form of global educational governance that is emerging, based on the influence of international agencies – 'globalization from above'. Educational systems are losing their national distinctiveness as bounded systems and products of unique national histories; education is no longer seen as a national cultural project, especially in developing countries. The role of a national education system is seen by OECD to support markets and provide a workforce; inequities and injustice for all are a small price to pay for economic benefits. The result of this process of standardisation of educational measurement is the loss of diversity of culture, traditions, beliefs and practices and with that, the loss of cross-cultural learning, together with the denial to countries of the policy-line of 'alternative' educational systems. This is becoming increasingly obvious to a growing number of countries, which are seeking alternative pathways within educational systems UNESCO (2009). The orientation of public education is changing from what used to be a focus on cultural and civic socialisation, to preparation for the workforce. PISA is a key instrument in the construction of a new governance regime that is widely embraced by the very governments that it disempowers. Is education a neo-liberal or a social democratic project? Should unique national education traditions be replaced by culturally indifferent comparisons, moving from input to output orientation? First, as to the impact of the PISA data, the political message of such case studies

is a conservative one. There is no magic solution for low national educational achievement as measured by results of international tests like PISA and TIMSS. More boldly, Rogers claims the Western tradition for their own vision: it will stand in the best tradition of Western rationalism if we question the authority of global assessments, contextualise their meaning, and delineate their utility, thereby increasing the wisdom of both test-makers and test consumers.

2.4.2 TIMSS as an international assessment tool

The Trends in International Mathematics and Science Study (TIMSS) was first administered in 1995, and has continued every four years. TIMSS 2015 marked the 20th year of data collection. Sixty countries and benchmarking cities participated in the 2015 cycle. Hutchison et al. (2007) summarised the kind of information sought by TIMSS grade 8 features:

- International variations in mathematics and science curricula, including variations in goals, intentions and sequences of curricula.
- International variation in the training of teachers in science and mathematics.
- The influence of officially prescribed textbooks on the teaching of mathematics and science.
- The course content that is actually taught in mathematics and science classrooms.
- The effectiveness of different instructional practices.
- Students' achievement, especially in the area of non-routine problem-solving and the application of science and mathematics in the real world.
- The attitudes and opinions of students and teachers.
- The role of technology in the teaching and learning of science and mathematics, particularly the use of calculators and computers.
- Participation rates in pre-university courses, with particular regard to gender-based differences.

- The effect of tracking, streaming and other practices used to influence or direct students' course selection.

Hutchison and colleagues (2007) also analysed the TIMSS framework as composed of two frameworks: an assessment framework for two subjects, mathematics (Number, Algebra, Geometry, Data and chance) and science (Biology, Chemistry, Physics and Earth Sciences) in addition to cognitive; and a curriculum framework, which consists of three layers, as seen in Figure 2.1:

- Intended curriculum
- Implemented curriculum
- Attained curriculum.

Mullis et al. (2016) mentioned that countries devote considerable energy and resources to updating their mathematics and science curricula. In each assessment, at least half the countries report they are reviewing their curricula. During the 20 years of TIMSS, nearly all countries have implemented periodic curriculum reforms, ranging from updates to full-scale revisions.

Dubai, a benchmarking city, began participating in TIMSS in 2007. Sixty-four countries now have TIMSS trend data, which allow comparisons of their students' achievement to that of their international peers and to the achievement of past students from their own country.

TIMSS is designed to measure student achievement in mathematics and science to students at grades 4 and 8. The assessment focuses on the core set of objectives for each subject. Although student interests will vary, educators agree that a core set of objectives in each learning area is essential in today's world. Some of these objectives are subject-related and termed content domains within TIMSS. However, research has also shown the importance of equipping students with a wide range of skills that cut across disciplines. These are referred to as cognitive

domains. The strength of TIMSS lies in its assessment of students in both the content and cognitive domains.

In UAE and Dubai, policy-makers have taken decisions on participating in such international tests to catch up with the rapid development happening in private schools in Dubai and in the outside world, where the most important aspect is to get a student to the level at which they can compete with the international students. The participation in an international assessment test was an important step for KHDA to take. Motivated by the value of gauging what students in Dubai could do in comparison with their peers regionally and internationally, decision-makers have ensured that Dubai is now a participant in all major international assessments.

2.4.3 Using TIMSS results in education reform

Daus and Braeken (2018) mentioned that attention to opportunity to learn is important for fair comparisons of educational systems. At first sight of the results in their study, one might thus be inclined to appreciate that TIMSS achievement seems insensitive to differences in opportunity to learn within countries, based on current indicators. Yet, learning clearly occurs across a child's development, so why is it so difficult to connect empirically the most obvious conceptual relationship (i.e., opportunity to learn and achievement) using data from the international educational assessments? Progress in research on the effects of curriculum implementation will be gained only if more attention is placed on the validity and precision of the measures. One place to start the debugging is deeper scrutiny of the indicators and instruments for opportunity to learn in TIMSS.

Johansson and Hansen (2019) examined the impact of international large-scale assessments (ILSAs) on policy-making in different educational systems around the world; their aims was to examine whether national mathematics curricula in different educational systems harmonise over time. Data from TIMSS was used to explore this issue. In addition to background

questionnaires given to students, teachers and schools, a curriculum questionnaire was completed by each national research coordinator (NRC) in all participating countries in each TIMSS cycle. The data from 2003, 2007, 2011 and 2015 was used. The analysis focused on the information about the extent to which the national mathematics curriculum covered certain topics in the subdomains of mathematics tested in TIMSS Grade 8. Growth curve modelling and latent profile analysis were applied to uncover the development trend and countries' unobserved profiles in mathematics content domains of Number, Algebra, Geometry, and Data. Three clusters of countries were identified. Most countries belonged to the same profile in the later cycles of TIMSS. The study found indications of a general harmonisation with respect to the number of topics covered in countries' curricula over time, thus contributing to discussions of policy implications of a global curriculum.

Lin (2018) mentioned that TIMSS is a time-series database, which provides an early warning for necessary curricular reforms in mathematics and science subjects and offers an opportunity for schools and policy-makers to reflect on the effectiveness of educational changes. It provides vital data for governments and researchers to compare and contrast the differences in students' mathematics performance within and between countries. Chinese Taipei's Ministry of Education (MOE) has used successive cycles of TIMSS data as a guide for formulating educational policies, and an evidence base for evaluating their effects. Although Taiwanese students have performed well in TIMSS, the percentage of students reporting low confidence in and low enjoyment of mathematics is significantly greater than the international average. Lin (2008) examines the strong connection between TIMSS and mathematics education reform in Chinese Taipei, showing how the TIMSS 2003 results (Mullis et al., 2004) led the MOE to develop the 2006 'After Class Support' policy and the subsequent TIMSS data-inspired 'Just

Do Math' programme, a new approach to mathematics teaching and learning introduced in 2014.

Lee and Stankov (2018) examined the predictability of non-cognitive variables for students' mathematics achievement, based on the large-scale international databases of TIMSS 2003, 2007, and 2011, and PISA 2003 and 2012. They synthesised empirical evidence about 65 non-cognitive variables, which were categorized into 13 research domains of educational psychology effect, curriculum/content exposure, homework, learning and instructional time, motivation, personality traits, planned behaviour, school climate, self-beliefs/social-cognitive theory, self-regulatory learning style/strategies, teacher behaviour, value, and vocational interest. Their analysis showed that a group of self-beliefs constructs in particular, self-efficacy in PISA, confidence in TIMSS, and educational aspiration, in both TIMSS and PISA were the best predictors of individual-level student achievement in mathematics. The present review supports the claim that students' projective judgements about their own ability and future selves are particularly important for their academic achievement. Lee and Stankov discussed potential educational initiatives to maximize educational outcomes of students from diverse cultural and national backgrounds. They also explained that the measures that demonstrated at least moderately strong predictive validity for achievement at both individual and country levels might be particularly important because the findings were linked to various conditions at the individual as well as system/country level. Traditionally, student socio-economic status (SES) background was viewed as 'fixed' and exerting indirect influences on student achievement. Thus, interventions based on SES were largely considered to be outside of the paradigms of school-based programmes. However, it is not entirely irrational, to promote SES-related variables in the school system; for instance, by advocating, the importance of education of parents themselves, in addition to their children, or by implementing the systematic evaluation

of the availability of adequate or minimum-level education-related resources at home. As Lee and Stankov's (2018) analysis within country and between countries suggests, such provision would be more important for less developed countries. School-based initiatives were designed to provide appropriate monitoring and assessment of students' self-belief in their academic work. Intervention programmes targeting a good calibration of self-beliefs and reduction in test anxiety might be particularly useful in countries having lower academic achievement scores (Lee, 2009). Supporting policy measures to help students to become less anxious and appropriately confident in schoolwork was planned at the system level, (OECD, 2015).

Stacey et al. (2018) mentioned that 20 years of collected TIMSS data reveals interesting insights into the globalisation of science curricula. To answer the research questions, they used three different methods to analyse the TIMSS dataset. First, changes in countries' intended science curricula were captured and coded over the course of three TIMSS cycles (1999, 2007 and 2015 for Grade 8, and 2003, 2007 and 2015 for Grade 4). Changes were identified using countries' responses to the TIMSS curriculum questionnaires. This approach tracks changes in national science curricula over time. Second, cluster and discriminant analysis of the curriculum questionnaire data were used to determine potential convergence of curricula; countries may be clustered into groups on the basis of the topics included or not included in their intended science curricula. Third, the TIMSS encyclopedias and TIMSS teacher questionnaires provide detailed information on additional features of the implemented science curricula, such as the mean time spent teaching science in each country, or the percentage of students taught the TIMSS science topics. Such information was carefully analysed for a subsample of countries. However, inconsistencies in the way this information was collected and presented across different TIMSS cycles made comparisons across countries between cycles challenging. As each of the three methods used by Stacey et al. (2018) has its advantages and limitations, investigating the three

research questions from different angles and with different, yet complementary techniques offered the most comprehensive analysis of the available TIMSS data.

Sahin and Ozturk (2018) aimed to examine the effect of classroom assessment on science and mathematics achievements. For this purpose, hierarchical linear modelling (HLM) was performed using variables such as learning science/maths, engage teaching in science/maths, confidence in science/maths, and home resources for learning variables at the student level, and experience, education level, homework, and assessment at the teacher level. The sample of the study consisted of 4th grade students who participated in TIMSS 2015 in Turkey. According to the findings, 36% of variance in science achievement, and 40% of variance in mathematics achievement, were due to variability between classes. In a random coefficient model, all student variables were found to be statistically significant predictors of science and mathematics achievement. Among these variables, the greatest effect size was the self-confidence variability. Only the teacher variables were added according to the Means as the outcome model; the teacher's experience and emphasis towards national achievement tests or monitoring students' progress had a statistically significant effect on science and mathematics achievement. Finally, according to the intercept and slopes of the outcomes model, the most important variable was the emphasis towards national achievement tests or improving students' progress in both science and mathematics.

Eriksson, Helenius and Ryve (2018) questioned whether instructional quality can be measured using TIMSS items and how often certain instructional practices are used in the mathematics classroom. The researchers focused on three instructional practices that have been the topics of longstanding debates in the educational literature: memorising formulae, listening to the teacher and relating mathematics to daily life. In a multi-level multiple regression analysis, they examined how class-level responses to these items predicted mathematics achievement. In

Sweden, across four waves of TIMSS, relating to daily life was a negative predictor of achievement, whereas memorising formulae and listening to the teacher were positive predictors. This was also the typical pattern of results across all countries participating in two waves of the international TIMSS. Eriksson et al.'s, findings are in line with certain positions on the above-mentioned debates. Although conclusions are limited by the correlational nature of the data, the researchers argue that TIMSS is a promising tool for evaluating the effectiveness of different instructional practices.

Prinsloo and Harvey (2018) mentioned that the choice of instructional language is influenced by both previous and current perceptions of the value of a given language. For many South African learners, this has contributed to their education being presented either partially or entirely in a second or third language. This effectively limits their cultural capital and educational opportunities. The negative impact of non-equivalence between home language and instructional language is arguably more influential for linguistically dense school subjects, for example science more than mathematics. The TIMSS 2015 data allows exploration of the relationship between language non-equivalence and academic achievement as well as its differential association across subjects. Prinsloo and Harvey's results indicate that improvement of the processes leading to instructional language proficiency, be it at learner, teacher or school level, will contribute to higher academic achievement amongst South African learners and indeed for international second-language learners. With regard to classroom science teaching and learning, it is also noted that teachers need to be cognisant of the continuing impact of language for learners, as they may need to incorporate innovative techniques and/or guidance.

Abu Tayeh, Al-Rsa'I and Al-Shugairat (2018) identified the reasons behind the Jordanian students' drop in performance in the TIMSS 2015 from the point of view of their teachers. A survey method was used because teachers are the most able to decide upon the reasons for this

fall, and so a questionnaire was designed to elicit their points of view concerning the reasons for this retreat. The population consisted of 130 teachers of science and mathematics in Ma'an governorate. Teachers whose teaching experience was more than one year participated, to ensure they were familiar with TIMSS tests. Random sampling technique was used to select 90 teachers representing 69% of the study population. For data analysis, means and standard deviations were calculated, and the Schiffe test was used to determine the post differences. The results show that the reasons relating to the students themselves and their families got higher averages than those relating to the teachers and the curricula. The averages relating to the male teachers were also higher than those relating to the female teachers. There were no statistical differences in the teachers' appreciation averages of the reasons for this retreat according to their academic specialisation (maths or science) or their practical experience.

Rozman and Klieme (2017) mentioned that between 1995 and 2007, reports from teachers and students as part of TIMSS, documented considerable change in instructional practices at any country level. This indicates that traditional classroom teaching was shaped by policies or changes in professional norms in that country. They mentioned that changes in subject didactics from computational to problem-solving approaches in mathematics education were visible in a few countries only. In comparing and relating mathematics to daily lives, and working in small groups, there were mixed findings between 1995 and 2003 and 2003 and 2007. The change towards more collaborative learning was most clear in East Asian countries.

Mullis et al. (2017) mentioned that over the last 20 years TIMSS and data results have shown a stable set of policy-relevant modification. They studied achievement from one assessment cycle to the next and its relation with the policies and practices to check if a pattern exists.

2.4.4 PISA as an International assessment tool

OECD (2012) identified that the international standardised assessment PISA, which was developed jointly by the countries that participate in it, is an assessment for students at 15-years old in different main educational programmes such as English, mathematics and science. OECD (2013) clarified that PISA is informed, and the assessment is not based on the country's main curriculum, instead it is based on the skills and knowledge the students were learning from their curriculum and how to apply it, how to reflect on the real-life problems and how to find solutions to them. In years 2000 and 2002, 43 countries participated in the PISA; in the second cycle in 2003 there were 41 countries. In 2006 in the third cycle 57 countries, in the fourth cycle (2009 and 2010) 75 countries participated. In PISA 2012, 66 counties participated while in 2015 cycle the number of countries participating was 71.

PISA assessment covers three main areas and it is not based on the knowledge learned in these subjects (mathematics, science and reading), but whether students can extend their learning and apply their knowledge to problem-solving in different situations. PISA assessment concentrates on the understanding of concepts and the ability to perform in various situations within each area. The assessment takes place every three years, and each of these cycles looks in depth at a major domain, to which two-thirds of the testing time is devoted; the other domains provide a summary of skills. Major domains have been reading in 2000 and 2009, mathematics in 2003 and science in 2006. In 2012, the major domain was mathematical literacy, while in 2015 science was the major domain. In addition, students answer a background questionnaire, to give information about their own, homes, teachers and school's characteristics; these give a valuable knowledge base for policy analysis and research.

Hutchison et al. (2007) mentioned that OECD claims that PISA provides insights into the factors that influence the development of the skills at home and at school and examines how these factors interact and what the implications are for policy development. The PISA test has

the student assessment (a student questionnaire). A long with a school questionnaire for Principals.

Morgan (2015) traced the sub-national effect of PISA in Canada's decentralised educational system, using three themes that facilitated the modelling of the PISA by sub-national entities:

1- a preoccupation with the international benchmarking of sub-national educational performance,
2- a shift away from a curriculum-based assessment to a competency-based one, and
3- the adoption of organisational systems and processes of assessment aligned with supranational assessment practices.

Morgan (2015) used the concepts' 'framing' (Juillet, 2007) to describe how the OECD's PISA offers domestic policy-makers an authoritative 'storyline' that helps them legitimised their policy reform.

Addey and Sellar (2017) examined why countries participate in PISA, by understanding the role that international large-scale assessments play in global education policy. They found that participation was for the following: evidence for policy; technical capacity building; funding and aid; international relations; national politics; economic rationales and curriculum and pedagogy. In addition to different theories of policy diffusion and adoption.

Baird et al. (2016) clarified that data from PISA was used in educational policy formation in many countries. Mullis et al. (2016) mentioned that countries devote considerable energy and resources to update their mathematics and science curricula. In each assessment, at least half the countries are revising their curricula.

2.4.5 Using PISA results in education reform

Sjoberg (2018) stated that PISA could hardly measure the skills and competencies acquired in experimental work in a lab or on an excursion; neither could it capture the kind of interest,

curiosity and enthusiasm that may be the result of argument or, inquiry, and the search for solutions to questions that the students have formulated themselves. However, these aspects are part of the definition of science literacy in PISA as well as in other sources. The use of PISA data for policy recommendations is, at best, very selective. If one 'believes in PISA', one has to take all the results seriously, including those which are counterintuitive and at odds with other research findings and policies that are recommended by scientists as well as science educators. The danger is that in politicians' priority to climb on the PISA rankings, and their sacrifice of the educational strife for a better, more interesting, authentic, context-based and relevant science education for the learners, larger resources are used by the governments to run the PISA project, and many academic institutions are dependent on contracts to run PISA and other ILSAs. Given the great political and educational importance of PISA, there is a strong need for critical and independent research. Above all, science educators should address the contradictions in the messages from the different international actors, and face the cultural, political and ideological tensions between different views on the role and purposes of school science.

Sahlberg (2018) discussed that PISA had made Finland an educational celebrity by firstly finding answers about the possible reasons behind strong educational performance that has turned the focus from the future to the past among the education community in Finland. Visitors to Finland often want to know what enabled the Finns to transform their education system when most others did not. Many university professors, education authorities and school principals have spent much of their time and resources in travelling, making presentations and writing about the Finnish education system in the past and present, to tell the story of education reform in Finland. This was at the expense of the continuing development of the education system for the future. Ironically, the success of the Finnish education during the past three decades is due

to forward-looking education policies and active learning from other countries' education reforms and innovations. Secondly, being in the lead is not always easy; just as in hiking or skiing, it is easier to follow others and learn from their actions than to lead the way. Finland has always depended on ideas and innovations from other education systems. In other words, Finland has been an importer of education policies and solutions. Now these roles have changed. Many countries would like to borrow or transfer models of schooling from Finland. In Finland, the response to these inquiries has been passive until very recently. However, 'education trade' is becoming a new potential area of income for experts and businesses in Finland. This may have some unexpected consequences unless the provision of highest quality education is guaranteed for the Finnish people. Thirdly, continuous occupation of the top position often leads to a state of complacency. It encourages the feeling that when everything seems to work well there is no need to make any changes to the way things are. Although there are many who believe that good education is more than high scores in some academic subjects, there is an increasing tendency to justify policies and the distribution of financial resources by using performance in international assessment studies like PISA. It is important that international student assessment studies are used wisely in policy-making and education reform architecture. There is much more information in these existing studies that governments and the media have been able to use for better policies and deeper news reporting. Before considering any new forms of data collection, we should make better use of what we already have. PISA and other international benchmark tools are important for any government that cares about education in an open, globalised world. Using this data for the good of our teachers and students is a continuing challenge for us all.

Carvalho et al. (2017) mentioned that there is a selective mobilisation of knowledge, in such a way that recurrent public policy questions are kept, come back, or achieve greater visibility as

educational and public agenda problems, according to the tendencies imposed by the results and by the political orientation of the contenders. If the credibility that is ascribed to the knowledge generated within PISA offers its national users added legitimacy for debating and proposing policy measures, such insistent use adds authority to the survey and to the scripts it carries. Hence, it seems clear from Carvalho et al. that, in Portugal also, the use of PISA's credibility for the benefit of the ideas and policies to be included in the policy agenda and to implement it is somehow superimposed on the expected rationalisation of public action. This observation supports the hypothesis that 'knowledge for learning' processes are rarely considered when the actors mobilise PISA data to elaborate arguments about their systems (Pons, 2012). The analysis of the PISA trajectory in the policy processes in Portugal reveals what the literature on knowledge policy relationships has been exposing for many years. The impact of research knowledge on policies depends on a combination of elements, such as the level of the policy actors' knowledge and expertise of the subject, or the compatibility between that knowledge and actors' ideological compromise or strong interests (Weiss, 1990). It also seems clear that the critical factors for the presence of comparative assessment knowledge in policies relate to the origin and type of knowledge; to the ways in which knowledge is mobilised, to the contextual and interest-related features of political action, and to the historicity of the rules and beliefs that guide it. In this context, the emergence in Portugal of new actors and ways of translating PISA data/information/knowledge for policy is a trace of originality in the processes of reception that requires further observation. In summary, PISA data and analysis open and close routes and establish a set of possibilities for policies. Mobilised in various sociocultural spaces, PISA acts upon systems of meaning and power relations, which it helps to rewrite, thus producing specific effects (Popkewitz, 2003). Hence, the regulatory role of PISA seems clear:

it enables the emergence of judgments about the school systems, the construction of opinion on policy decisions, and the reasoning of decisions based on knowledge perceived as 'real'.

Tasaki (2017) mentioned that in the PISA survey, Japan is always highly ranked except in reading comprehension. One might wonder why Japan makes an effort in PISA. When Finland was ranked first in 2000 and later, it became an external model of education (Takayama, 2010). In PISA 2015, Asian countries and economies such as Singapore, Taiwan, Hong Kong and Macao were ranked first or at least higher than Japan, although there was certainly emulation among students. The Japanese wished for children to be provided with the competencies, including academic ability, to be autonomous in this rapidly changing society. The government, industry, and the business world demanded an increase in human resources as Japan does not have many natural resources, and an emphasis placed on education. The teachers are generally keen about children's education, demanding an improvement of their teaching conditions. Japan has been deeply engaged in OECD projects since its establishment. The OECD's key competencies are similar to Japan's 'ability to survive'. So far, basic knowledge and skills, such as reading, writing and arithmetic have been thought to make children autonomous, but globalisation has required ICT skills and English, which add to the curriculum. Through the PISA survey, some characteristics of Japanese education became clearer, and Japan became deeply involved in solving the problem of children's low motivation. The competition of scores in PISA is not considered, but it is a precious indicator for children to grow up in a globalised world. For this reason, Japan has accepted PISA results and recommendations and has improved the national curriculum to better take into account the new challenges of a rapidly changing world. Cognitive aspects of competences such as reading to learn and emotional ones such as interest and motivation, are not easy to acquire in class.

Volante (2013) studied the effect of the international assessment testing of the Canadian educational policy. A variety of factors influence the nature and degree of policy responses to large-scale international testing within the different Canadian provinces. Three different patterns were noted: 1- the relative ranking of the different country's provinces, 2- curriculum reforms often intensify for tested subjects in response to international test results, 3- school renewal efforts are tied to international test results and are heavily influenced by geopolitical forces. This will influence the nature and degree of policy response to international test results. The present analysis is timely, given that many Canadian country provinces have developed research offices linked to school improvement initiatives driven by large-scale testing. Thus, the findings will be a welcome addition to the Canadian literature, given the diversity of policy responses to international comparison testing. It is worth noting that much of the current literature on this topic tends to focus on the American and British educational systems (Black & Wiliam, 2005); Mustique-Forrester, 2005. Since the scope of Volante's research is Canadian in its orientation, the synthesis of trends provides a useful starting point for a more critical discourse about the opportunities and constraints associated with international testing and educational policy development.

Pons (2017) highlighted three main challenges for researchers on PISA's effects on governance and education policy. The first is theoretical and concerns the notion of a 'PISA effect' itself. The literature that has been covered above is mainly qualitative so that there is no statistical study, which would measure a PISA marginal effect on governance, or rank it among others according to importance and degree of significance. However, more deeply it remains very difficult in this literature to make explicit the vision of a PISA effect from the authors. What *is* a PISA effect, finally? Is it sufficient to observe that policy actors use PISA in their speeches or in policy texts in a specific historical period to conclude that there is a PISA net or marginal

effect? The French case that was studied is an interesting counter-example: an increasing number of speeches on PISA in a country does not necessarily mean that this survey has an effect or influence on domestic education policy. In France, the PISA policy debate has clearly extended since 2001, but it recently led to a 'trivialisation' of PISA and to less attention being paid to its statistical content (Pons, 2016). Thus, conceptualising a PISA effect requires a deep knowledge of the long-term dynamics of education policies in many different contexts and to conceive conceptual tools and theoretical frameworks, which allow one to take into account both changes at different policy levels and the variety of reception regimes at work in education systems. PISA would be emblematic of the 'comparative turn' of education policies (Grek, 2009), of the 'topological turn' of education governance (Lingard et al., 2013), of a new 'audit culture', of a new 'global testing culture', etc. This way of conceptualising, which is frequent in the international literature on education governance, has the merit of stressing important changes, but it can also overestimate the latter and the lack of history, and when these 'turns' or 'cultures' multiply, they tend to suggest scholars' difficulties in understanding the deep meaning of governing changes at work rather than improving knowledge. The second challenge is more epistemological. Pon thinks it is particularly important to preserve an epistemology of uncertainty concerning PISA effects and to keep in mind that the outcomes of policy or politics are fundamentally uncertain, since they depend on complex social exchanges. It seems important, at least a priority, not to take for granted a series of representations about PISA effects. Pons is not saying that this is reality but that it is epistemologically necessary to keep in mind that things could be different. The third challenge is methodological. We believe it is important now, after 15 years of research on the effects of PISA on governance, to 'normalise' this topic. Normalising this topic also means not to keep overestimating its originality because of an over specialisation.

Morgan (2016) argued that PISA, as a universalising project for education, is being uncritically replicated through the implementation of student assessments at the national level. By drawing on the policy studies and policy sociology literature, Morgan, found evidence of policy discursive practices and techniques, which led to the creation and replication of a PISA-modelled assessment sub-nationally in the form of the Pan-Canadian Assessment Program. Three key themes emerge which facilitate the modelling of universalising educational projects such as PISA: (1) a preoccupation with the international benchmarking of students' performance, a testing culture that includes the belief and acceptance of a standardised testing of students to accurately reflect students' learning and the quality of schooling. (2) A shift away from curriculum-based assessment to a competency-based one that is aligned with PISA framework, where a discourse that revolved around measuring learning outcomes that were based on literacy frameworks rather than subject-matter frameworks in which it was introduced into the Canadian educational system. and (3) the adoption of organisational systems and processes of assessment aligned with supranational assessment practices, where sub-national ministries of education and local school boards integrated the analysis of large-scale assessments into their institutional practices to facilitate the rapid integration of PISA into the Canadian educational system. Canada's sub-national authorities need to be cautious about undertaking educational reforms borrowed from transnational actors such as the OECD, while neglecting to adopt locally informed diverse perspectives including those of students, teachers and communities.

Rutkowski and Rutkowski (2016) clarified three recommendations for the importance of a more completely and transparently communicating limitations when reporting and interpreting PISA results; the first recommendation is for clearly published caveats. Although PISA technical documentation and reports typically warn readers of many of the limitations of the data, these

cautions are usually buried among other details and information. A second recommendation is to be consistent in documenting and reporting only the analysis that is methodologically sensible. The third suggestion is for restraint commensurate with the level of influence to be exercised by all parties when interpreting results and making policy recommendations.

Melia (2016) examined PISA as an International Assessment and summarised that international studies should commit to reconcile local perspectives with international reference and that they do not jeopardize a progressive decrease in diversity. In the context of globalisation, education is also affected and it can be an element that dilutes the country's own characteristics, but contributes to its improvement.

Shin (2014) investigated how the role of the school's autonomy on student performance may vary from one country to another depending on the country's development level, teacher characteristics and accountability, using different country-level averages of the PISA 2012 maths dataset. The findings were that autonomy effects on student achievement vary according to the area of decision-making and interact with a country's development level and with teacher characteristics. In addition, the effects of autonomy are positively associated with teacher's participation in professional development hence, affecting the students' performance; whereas accountability does not show any clear interaction with school autonomy. To summarise, autonomy's impact on student performance is highly dependent on decision-making, development levels, and teacher characteristics across a country; while with accountability, there are other implications in some systems, hence popular education policies may not produce expected effects in different education systems due to the complexity of variables interacting in the system.

Agasisti (2013) studied efficiency PISA 2006 data aggregated to the school level Data envelopment analysis (DEA) was used to compute efficiency scores for a sample of Italian

schools by. Efficiency has been defined as the ability to transform inputs (resources, student background, etc.) into outputs (student achievement). Different versions of the DEA models were estimated to test result robustness, including a DEA bootstrapping procedure. In a second-stage analysis, the factors affecting school efficiency were investigated through a Tobit regression. Among these factors, alternative indicators of competition were included. The results showed that at least one indicator of competition is statistically associated with higher performances of schools, suggesting that there is a potential role for improving school results by increasing the number of schools competing with each other. These findings are consistent with a previous analysis conducted on the same dataset by estimating an educational production function. The question is about the regulation to which private schools must be subjected. Indeed, even if they experience much more autonomy than their public counterparts, some relevant rules were also defined for them. The basic idea is that they should demonstrate to have some features in common with the public schools, such as students-teacher ratio, curricula, etc. There is an obvious reasonable justification for the existence of some common rules, which relies upon the opportunity of an accreditation procedure. Nevertheless, the extent of such regulation is questionable. Every attempt to make private schools more similar to public ones is coherent with equity and homogeneity reasons, but it (negatively) affects the potential competition at the same time. Then, this trade-off must be adequately assessed. Perhaps, it is time in Italy to re-think the framework for private schools and let them operate with a bit more freedom.

Breakspear (2012) suggested that PISA plays an important function for policy-makers as they seek to evaluate and improve system performance in response to the demands of the global knowledge economy, to show that PISA has an influential normative effect on the direction of national education policies, although the extent of influence varies across countries. In some

PISA participating countries, policy-makers have made only small policy adjustments to respond to PISA results and align system policy-setting with international standards. Yet there is evidence that in other countries policy makers have responded quickly to the PISA results of their system and have moved to incorporate the PISA norms and standards more deeply into the national policy processes and instruments.

Bieber and Martens (2011) defined in the PISA context that OECD influence is identifying systemic weaknesses. From best practice examples of 'winner countries' such as Finland, they drew recommendations to improve education systems and further them at the international level. These entered national policies to a different degree. Bieber and Martens aimed to answer the question of if and how OECD with its soft governance mechanisms in the context of PISA could produce convergence of national education policies in Switzerland and the US towards its recommendations. The results showed the whole range of policy reactions to PISA, from comprehensively reforming the education system in well-scoring Switzerland to not giving it any importance in the underperforming US. Switzerland introduced reforms in social equity based on results of PISA, while in the US it has been far from the centre of attention in recent and on-going reforms in education policy. Switzerland did not converge towards the PISA recommendation of increasing school autonomy, whereas this has always characterised the US system. With regard to cooperative school structure, educational standards, as well as research and statistics, Switzerland implemented change, but the US showed a fit with these recommendations. Interestingly, neither country passed reforms to promote gender equity. In teaching quality and quality assurance, they both matched OECD recommendations before PISA. Only in Switzerland can one observe reforms that depend on PISA. The US match many OECD recommendations or had introduced them without reference to PISA. So what caused these diverging reactions? In Switzerland, federalism and the corresponding strong cantonal

competences had hindered far-reaching reforms in education for decades, resulting in a high problem due to a lack of intra-Swiss mobility. PISA opened a window of opportunity, as national actors referred to the study to legitimise the introduction of necessary reforms. As a result, the agreement on enhanced interactional cooperation with the aim of uniform educational quality led to a fundamental rearrangement of steering (Bieber, 2010b). Hence, the reform backlog was overcome. This was also the case in the US, where it did not trigger any change in education policy (Martens, 2010). The US PISA scores were discussed by only a few experts. The mediocre results confirmed the common estimation of the system's performance. Thus, the US engaged in independent problem solving, which also resulted in great consistency with the OECD recommendations. The findings show that the extent of policy convergence depends on whether OECD can trigger convergence mechanisms in the respective country if there is local problem pressure. With Bieber and Martens, two case studies, demonstrated that reactions to PISA in terms of policy convergence differed significantly due to the problem pressure and impacts of OECD mechanisms. Further comparative case studies are needed to assess the effects of international education activities on national education policies (Knodel et al., 2010). They may offer more detailed knowledge on the reasons for change and continuity in national education systems.

Baird et al (2011) discussed how the high performing countries such as Canada and China, in comparison with European countries that perform to the average policies, respond to PISA results. The impact of PISA on countries' educational policy was clear in countries such as England, France, Norway and Switzerland. Baird et al (2011) proposed a need to study policy changes in countries that was based on PISA results. This would raise awareness of the variety of narratives implemented in response to international tests, permitting a better-contextualised

critique of policy-responses contexts, as well as a wider and clearer view of the governmental influences of the global institution.

Minxuan and Lingshuai (2009) examined the outstanding performance of Shanghai students in PISA 2009, which made them example across the nation and across the world. This performance was due to three traditional factors and six modern factors. The traditional factors are parental expectations, beliefs in the power of effort, and the mechanisms of personal selection. The six modern factors are the openness of Chinese education, curriculum and teaching reform, teachers' training, improvement in compulsory education, and the reform of high school enrolment. In summary, the three traditional and six modem factors not only came together to affect the development of basic education in Shanghai, but also enabled Shanghai to achieve an outstanding performance in the PISA project. Although the above nine factors cannot be measured, they unconsciously influence education in Shanghai, and its teachers, parents and students. The three cultural factors show the influence of traditions on individual motivations, and the six policy-governed modem factors attribute to the guiding role that central government and relevant governmental sectors of Shanghai have played in basic education since reform. In general, basic education in Shanghai has been developing in the right direction with openness, learning, exploration and reform coming more and more into play. By participating in the PISA project, students have exhibited high academic fulfilment and have taken the lead at the level of basic education, indicating the quality and the fairness of basic education in Shanghai. Moreover, the results follow the nine traditional and modem factors discussed in their paper, factors which are the source of the nourishment of basic education in Shanghai.

2.4.6 PISA Based Test for Schools as an International assessment tool

Rutkowski (2015) examined the PISA-Based Test for Schools test (PBTS), which was an attempt by the OECD to create a school level assessment where the results are comparable to

existing PISA scales. Although the OECD warns that the assessment is not intended to be used to influence 'day-to-day' instruction, the organisation tells schools that the results can be used to compare students' levels "of proficiency in three key subjects with the levels of peers in your country and in some of the world's top performing school systems". Further, the OECD claims that "the results can be used as a gauge of how prepared students are to succeed in a global economy" (OECD, 2012a). Moreover, the OECD (2014) contends that the school-level assessment "is intended to be complementary to the main PISA studies by making PISA-Based results more accessible to a wider audience and empowering local educators to participate in and contribute to policy debates in their countries". The PBTS gives countries knowledge about their students in the following six areas:

- Benchmarking how well their students compare to peers beyond state and national borders to gauge how well students are prepared to become members of an increasingly global society.
- Assessing higher order skills and competencies including students' ability to extrapolate from prior knowledge and creatively apply content knowledge in maths, reading, and science to solve problems in unfamiliar settings.
- Establishing higher expectations that speak of global competitiveness, not just proficiency and content area knowledge.
- Providing a catalyst for reflection and discussion of school-level practices and policies.
- Analysing performance data that can inform and complement existing school improvement plans.
- Linking school results with practices and policies from systems and schools around the world gleaned from the main PISA assessments, as well as identifying connections between US policy issues and school-level practices.

Rutkowski explained the technical aspects of the PBTS assessment to be in line with the PISA main assessment design; the items are grouped into units with 2–12 items per unit. Items are then separated into three domains to include 45 reading, 35 mathematics, and 55 science items with a minimum target audience of 75 students per school. Accompanying the assessment is a student questionnaire, which includes questions about the student, the student's family and home, classroom and school climate, and learning activities. This questionnaire contains questions about the student's strategies in reading and understanding texts, and the student's views on the school environment, including issues related to science and mathematics classes. In addition to the student-focused questionnaire, a school questionnaire is administered to principals and covers such areas as the structure and organization of the school, student and teacher demographics, and school climate and resources.

Hopfenbeck et al. (2017) mentioned that international-large scale assessments have been seen by many as having a strategic effect on international education policy debate, within three categories: secondary analysis, policy impact and critiques. Findings indicated that studies based on the PISA dataset have led to progress in educational research while simultaneously pointing to the need for caution when using it to inform educational policy.

2.4.7 Using PBTS results in education reform

Lewis 2018 examined emerging techniques of educational governance – based on time, difference and potential – enabled by the OECD's PISA-Based Test for Schools. Lewis showed how PISA for Schools facilitates the production of difference through comparative test data, allowing educators to imagine, and bring about, different potential futures. Drawing on Deleuze's thinking around forms of difference, and the governance function of potentiality, and informed by interviews with key PBTS policy actors Lewis illustrated how the visualisation of difference produces a local desire amongst schools and educators to become other than what

they currently are across multiple temporalities, and how this 'impetus to action' makes new actions and futures possible. This constituted stating a theory of 'governing through difference and potential', where the underlying logic is for teachers to work on themselves in the present to continually improve the future.

Lingard and Lewis (2017) accepted that the OECD's PISA has become influential in policy terms globally but analyse the ways that the main PISA and PBTS tests are positioned differently in Australia and the USA because of contrasting educational federalisms in the two nations. Their argument is that while PISA is undoubtedly influential, its effects are nonetheless mediated by the political structures present within different nations, which in turn leads to quite distinct 'PISA effects'. For instance, Australia oversampling on main PISA to make its data available for national and state-level policymaking, whereas the USA, with its focus on local governance in schooling, does not oversample, meaning that main PISA does not have a comparable policy salience as in Australia. Conversely, the newer PBTS test originated in the USA with pressure from educators and philanthropic interests and has been implemented in a good number of schools, but it has not been taken up in the same way in Australia. Our analysis shows how these differences reflect the idiosyncratic workings of federalism in the two nations, in which the federal government has a stronger policy and funding role in Australia than has been before the case for the federal government in the USA.

Lewis (2017) explored the Programme for International Student Assessment PBTS, a local variant of the Organization for Economic Cooperation and Development (OECD's) influential PISA that not only assesses an individual school's performance in reading, mathematics and science against international schooling systems, but also promotes 17 identical examples of 'best practice' from 'world class' schooling systems (e.g. Shanghai-China, Singapore). Informed by 33 semi-structured interviews with actors across the PISA for Schools policy cycle,

and supplemented by the analysis of relevant documents, Lewis provides an account of how these concrete examples of best practice are represented in the report received by participating schools. Drawing upon thinking around processes of commensuration and the notion of 'governing by examples', the author argues that PBTS discursively positions participating schools as somehow being commensurable with successful schooling systems, eliding any sense that certain cultural and historical factors – or 'out of school' factors – are inexorably linked to student performance. Beyond encouraging the problematic school-level borrowing of policies and practices from contextually distinct schooling systems, Lewis argued that this positions the OECD as both the global expert on education policy and now with PBTS the local expert on 'what works'.

Lewis (2017) mentioned that their analysis of PBTS results demonstrates quite clearly the emergent spatialities associated with new modes of heterarchical governance in education, including the emergence of what would be described as topological spaces of measurement, comparison, and governance. As such, schools and schooling systems are positioned within a topological and commensurate space, in which continuities help to mark discontinuities (differential performance, practices, and policies). In particular, the identification of these discontinuities between participating schools and high performing systems is considered as providing the key impetus for local reform through system-to-school learning from main PISA (PISA Based for Schools). In this way, Lewis sees PISA Based for Schools reflecting the wider enfolding of global tests and discourses into local policies and policy-making processes (Thompson & Cook, 2014), where the language of 'elsewhere' is used to justify local reform. Our topological and relational analysis also emphasises the importance of acknowledging the spatial as a lens for understanding education policy-making processes within the field of comparative education, rather than merely providing fixed territorial units of analysis centered

on the nation-state. As we have shown, eliding the ontological distinction between place and space has significant implications for how comparative approaches undertake their research, both conceptually and methodologically. At the same time, we have suggested that OECD's PISA, in all its manifestations, also reflects the world culture theorists' argument about the global diffusion of modernity. The initial development of PISA for Schools and continuing item maintenance have been funded solely by US philanthropic trusts, rather than the voluntary Part II contribution of governments or the OECD; however, the test arguably meets a need for accountability data that is driven by legislation in the US. Also, and despite the enhanced involvement of new policy actors, the PISA governing board at the OECD retains the overarching responsibility for the programme to ensure the validity of both the test itself and the comparisons made with main PISA results. Such PISA governing board involvement is clearly about protecting the PISA 'brand'. The expansion of PBTS thus extends the policy influence of the OECD by enabling an unmediated influence on thinking about policy and practice at the level of schools and districts, extending the global eye (Novoa & Yariv-Mashal, 2003) of comparison to the local scale. It also greatly enhances the relevance of PISA to the school level, making it applicable for informing local policy and practice and, at the same time, making schools accountable to international performance comparisons and benchmarks in a way not previously possible with main PISA. However, the interviews suggest that PBTS also promotes the interests of the schools and districts that voluntarily choose to implement the programme, providing both global examples of best practice and a means of sharing such insights with networks of like-minded schools. Therefore, PBTS contributes to the emergence of new horizontal and vertical relationships in education policy networks that cut across traditional boundaries and spaces. It should be noted that, McGraw-Hill will do the analysis of PBTS data for participants in the US. These schools, or their overarching authorities, will pay

for this service provision, and it is likely that schools and districts at the ceiling of performance on existing state and national-level testing will be the most enthusiastic participants in PBTS. In this heterogeneous mix of players, we can see an emergent mode of heterarchical governance comprising multiple players: an international organisation, international and local policy-makers, private- and public-sector participants, and educational practitioners. In this case, the state is using vertical policy mechanisms (e.g., regulations and incentives to generate accountability data) that, in turn, open up horizontal spaces for new kinds of policy actors, such as intergovernmental organisations (the OECD) and edu-businesses. The analysis has shown the manifestations of the new spatialities of globalisation, not only as a context for heterarchical governance but also as the very means of its expression. Lewis saw the OECD reaching into new local spaces and promoting a topological rationality at the local school level by enabling comparison with the performance of schools and systems that are topographically distant, strengthening its position as the global expert and, in turn, its ability to normatively determine what counts in education. In this way, PBTS produces new points of connection and topological spaces, an 'infrastructure of accountability' (Anagnostopoulos et al., 2013) that folds the local and global together and elides the ontological distinction between place and space, and school and system. PBTS will potentially also bring the OECD's education work to the attention of teachers, parents, principals, and local communities, thus expanding the epistemic communities that the OECD helps to constitute and through which it exerts its soft-power mode of global governance in education. Again, it was reiterated that the OECD, unlike the accredited test providers, does not stand to financially benefit from the enactment of PBTS. However, the programme's real value lies in its ability to facilitate the OECD's reach into, and connection with, local education spaces in order to directly influence school-level policy and practice, thereby extending its own policy reach and relevance in the process. With PBTS, the OECD

has seemingly opened up innumerably more willing audiences, and spaces, ready to purchase its particular rendition of schooling success.

2.5 Chapter Summary

The previous chapter introduced the conceptual framework of this research through the explanation of the concept of globalisation and the international assessment framework for TIMSS, PISA and PBTS. Later, the theoretical concept for the research was discussed and some of the common theoretical theories were explained in relation to the main questions. The last section provided an extensive literature review to support the current research. The focus of the literature review was to present knowledge and ideas related to the use of results from international assessments such as PISA, TIMSS and PBTS in changing or modifying educational policies in participating countries.

CHAPTER 3: Methodology

3.1 Introduction

This chapter will explain the research design and the methods of data collection used to achieve the aims of this research (Johnson & Christensen, 2008). It will provide a general description of the research approach, which is a mixed method, and the use of the concurrent triangulation to check for the findings in this research. Then the research context, the selection of the participants, and the instruments used to analyse the data collected will also be discussed which included, quantitative methods analysis of the Trends in International Mathematics and Science Study (TIMSS), Programme for International Student Assessment (PISA) and PISA-Based Test for Schools (PBTS) results using independent t-test and analysis of variance (ANOVA) test, statistical analysis of test results and finally the principals' survey. These were followed by qualitative methods analysis of the school inspection reports for each school over the three academic years 2015-2016, 2016-2017 and 2017-2018. The validity of the methods used and the ethical consideration of the research with the research limitations are clarified in the last three sections of this chapter.

3.2 Research approach in general

Creswell and Creswell (2017), discussed the different that frameworks exist for designing a proposal. Although different types and terms abound in the literature, they focused on three: quantitative, qualitative, and mixed methods approaches. The first has been available to the social and human scientist for years, the second has emerged primarily during the last three or four decades, and the last is new and still developing in form and substance.

The research approach used in this study was mixed methods. The literature contains many definitions of mixed methods, as exemplified in Table 3.1.

Table 3.1 Definitions of Mixed Methods research

Definition	References
"A study combining quantitative and qualitative methods."	Fraenkel & Wallen (2010, p. G-5)
"When thinking mixed methods, most social scientists think in terms of some combination of qualitative and quantitative approaches to research."	Bazely (2002, p. 1)
"General term of approach when both quantitative and qualitative data collection techniques and analysis procedures are used in a research design."	Saunders, Lewis, & Thornhill (2010, p. 595)
"Mixed method research studies use qualitative and quantitative data collection and analysis techniques in either parallel or series."	Tashakkori & Teddlie (2003, p. 11)
"Designs which include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words) where neither type is linked to a particular inquiry paradigm."	Greene, Caracelli, & Graham (1989, p. 255)
"As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone."	Creswell & Plano Clark (2007, p. 5)

All of the definitions listed in Table 3.1 recognise that mixed-methods is identifiable to researchers as a distinct approach, which has evolved as a reaction to the polarisation of quantitative and qualitative research methodologies (Collins & O'Cathain, 2009). Quantitative methodologies favour the collection and analysis of 'data that differs in amount or degree along a continuum from less to more' (Fraenkel & Wallen, 2010). Quantitative data includes counts and measurements (e.g., empirical survey data collected using Likert scales, numerical experimental observations, and secondary data stored in databases and records). Qualitative methodologies, in contrast, favour the collection and analysis of data that describes or characterises but does not measure any attributes, characteristics, or properties. Qualitative data includes words, sounds, and images, including responses to face-to-face interviews or written

narratives, documents such as diaries or minutes of meetings, and observations made in natural settings, including photographs, audio, and video recordings (Merriam, 2009).

Creswell and Creswell (2017) explained how the mixed methods research has come of age. To include only quantitative or qualitative methods falls short of the major approaches being used today in the social and human sciences. Other philosophical assumptions beyond those advanced in 1994 have been widely discussed in the literature. Most notably, critical perspectives, advocacy/participatory perspectives, and pragmatic ideas (Lincoln & Guba, 2000; Tashakkori & Teddlie, 1998) are being extensively discussed. Although philosophical ideas remain largely 'hidden' in research (Slife & Williams, 1995), they still influence the practice of research and need to be identified. The situation today is less quantitative versus qualitative and more how research practices lie somewhere on a continuum between the two (Newman & Benz, 1998). The best that can be said is that studies tend to be more quantitative or qualitative in nature. Thus, finally, the practice of research (such as writing a proposal) involves much more than philosophical assumptions. Philosophical ideas must be combined with broad approaches to research (strategies) and implemented with specific procedures (methods). Thus, a framework is needed that combines the elements of philosophical ideas, strategies, and methods into the three approaches to research.

Crotty's (1998) study established the groundwork for the mixed method framework, suggesting that in designing a research proposal, we consider four questions:

1. What epistemology - theory of knowledge embedded in the theoretical perspective - informs the research (objectivism, subjectivism)?
2. What theoretical perspective lies behind the methodology in questions (positivism and postpositive, interpretivism, critical theory, etc.)?

3. What methodology-strategy or plan of action that links methods to outcomes-governs our choice and use of methods (experimental research, survey research, ethnography, etc.)?
4. What methods-techniques and procedures are proposed to be use (e.g., questionnaire, interview, focus group, etc.)?

These four questions show the interrelated levels of decisions that go into the process of designing research. Moreover, these are aspects that inform a choice of approach, ranging from the broad assumptions that are brought to a project to the more practical decisions made about how to collect and analyse data. With these ideas in mind, Creswell and Creswell (2017) conceptualised Crotty's model to address three questions central to the design of research:

1- What knowledge claims are being made by the researcher (including a theoretical perspective)?
2- What strategies of inquiry will inform the procedures?
3- What methods of data collection and analysis will be used?

Creswell and Creswell provided a picture, as shown in Table 3.2. This displays how three elements of inquiry (i.e., knowledge claims, strategies, and methods) combine to form different approaches to research. These approaches, in turn, are translated into processes in the design of research. Preliminary steps in designing a research proposal, then, are to assess the knowledge claims brought to the study, to consider the strategy of inquiry that will be used, and to identify specific methods. Using these three elements, a researcher can then identify either the quantitative, qualitative, or mixed methods approach to inquiry.

Table 3.2 Alternative Knowledge Claim Positions

Postpositivism	**Constructivism**
Determination Reductionism Empirical observation and measurement Theory verification	Understanding Multiple participants meanings Social and Historical construction Theory generation
Advocacy/Participatory	**Pragmatism**
Political Empowerment issue-oriented Collaborative Change-oriented	Consequences of actions Problem-centred Pluralistic Real-world practice oriented

Creswell and Creswell (2017), discussed the claims on knowledge that came from the pragmatists. Pragmatism derives from the work of Peirce, James, Mead, and Dewey (Cherryholmes, 1992). Recent writers include Rorty (1990), Murphy (1990), Patton (1990), and Cherryholmes (1992). There are many forms of pragmatism. For many of them, knowledge claims arise out of actions, situations, and consequences rather than antecedent conditions (as in Postpositivism). Instead of methods being important, the problem is most important, and researchers use all approaches to understand the problem (Rossman & Wilson, 1985). As a philosophical underpinning for mixed methods studies, Tashakkori and Teddlie (1998) and Patton (1990) convey the importance for focusing attention on the research problem in social science research and then using pluralistic approaches to derive knowledge about the problem. According to Cherryholmes (1992), Murphy (1990), and the researcher's own interpretations of these writers, pragmatism provides a basis for the following knowledge claims:

1- Pragmatism is not committed to any one system of philosophy and reality. This applies to mixed methods research in that inquirers draw liberally from both quantitative and qualitative assumptions when they engage in their research.
2- Individual researchers have a freedom of choice. They are free to choose the methods, techniques, and procedures of research that best meet their needs and purposes.

3- Pragmatists do not see the world as an absolute unity. In a similar way, mixed methods researchers look to many approaches to collecting and analysing data rather than subscribing to only one way (e.g., quantitative or qualitative).
4- Truth is what works at the time; it is not based in a strict dualism between the mind and a reality completely independent of the mind. Thus, in mixed methods research, investigators use both quantitative and qualitative data because they work to provide the best understanding of a research problem.
5- Pragmatist researchers look to the 'what' and 'how' to research based on its intended consequences where they want to go with it. Mixed methods researchers need to establish a purpose for their 'mixing', a rationale for the reasons why quantitative and qualitative data need to be mixed in the first place.
6- Pragmatists agree that research always occurs in social, historical, political, and other contexts. In this way, mixed methods studies may include a postmodern turn: a theoretical lens that is reflexive of social justice and political aims.
7- Pragmatists believe (Cherryholmes, 1992) that we need to stop asking questions about reality and the laws of nature.

Thus, for the mixed methods researcher, pragmatism opens the door to multiple methods, different worldviews, and different assumptions, as well as to different forms of data collection and analysis in the mixed methods study.

Many researchers use the mixed method to collect data and then to do side-by-side integration, where they start by discussion on the quantitative statistical results provided followed by qualitative interviews, or analysis of documents, or any type of qualitative strategy to confirm the quantitative results. The concurrent triangulation design requires a great effort and expertise to study adequately a phenomenon with two separate methods and it can be difficult to compare

the results of two analyses using data of different forms. In addition, a researcher may be unclear as to how to resolve any differences that arise in comparing the results; although literature shows that when there is a difference in results comparisons, another collection of data is implemented to resolve such a difference, by revisiting the original data and viewing it in depth or by implementing a new project that addresses this difference (Creswell & Plano Clark, 2007). Baker (2015) mentioned that pragmatism offers a strong emphasis on research questions, communication and shared meaning. In connecting theory to data, it uses abduction, which has been found to be particularly useful during the integration stage of mixed methods. Pragmatism recommends a balance between subjectivity and objectivity throughout the inquiry. Finally, its emphasis on transferability offers a paradigm that can revise previous or create new disciplinary theories based on a particular context but still generalisable to other contexts. The central premise of mixed methods is that 'the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone' (Creswell & Plano Clark, 2007). Qualitative and quantitative approaches have their advantages and disadvantages (Atieno, 2009; Creswell, 2014; Duffy & Chenail, 2008; Yoshikawa et al., 2008) but mixed methods may help to integrate the advantages of both (McMillan & Schmacher, 2010). For example, a quantitative survey may generate summary information that can be generalized to a population, whereas a qualitative inquiry may generate more detailed information about the individuals and small groups of individuals within a population (Glesne, 2006). A major consideration in choosing a mixed methods approach is whether the research question is appropriate for mixed methods, or would a single method suffice (Lingard, Albert & Levinson, 2008). Similarly, Onwuegbuzie and Teddlie (2003) asserted that researchers undertaking mixed methods techniques should seek to defend explicitly the approaches they are employing.

Creswell and Creswell (2017) discussed the choice of a research design's assumptions about knowledge claims. In addition, operating at a more applied level were strategies of inquiry (or traditions of inquiry, (Creswell, 1998); or methodologies, (Mertens, 1998) that provide specific direction for procedures in a research design. Like knowledge claims, strategies have multiplied over the years as computer technology has pushed forward data analysis and the ability to analyse complex models, and as individuals have articulated new procedures for conducting social science research. These strategies of inquiry contribute to our overall research approach. Creswell and Creswell introduced the strategies of inquiry which can be viewed in Table 3.3.

Table 3.3 Strategies of Inquiry

Quantitative	Qualitative	Mixed Methods
Experimental designs Non-experimental designs such as surveys	Narratives Phenomenologies Ethnographies Grounded theory Case studies	Sequential Concurrent Transformative

Creswell and Creswell (2017) studied the strategies associated with the mixed methods approach. Those which were less well known than either the quantitative or qualitative strategies are those that involve collecting and analysing both forms of data in a single study. The concept of mixing different methods probably originated in 1959, when Campbell and Fiske used multiple methods to study the validity of psychological traits. Campbell and Fiske encouraged others to employ their 'multimethod matrii' to examine multiple approaches to data collection in a study. This prompted others to mix methods, and soon approaches associated with field methods such as observations and interviews (qualitative data) were combined with traditional surveys (quantitative data) (Sieber, 1973). Recognising that all methods have limitations, researchers felt that biases inherent in any single method could neutralise or cancel out the biases of other methods. Triangulating data sources- a means for seeking convergence across qualitative and quantitative methods- were born (Jick, 1979). From the original concept

of triangulation emerged additional reasons for mixing different types of data. For example, the results from one method can help develop or inform the other method (Greene, Caracelli, & Graham, 1989). Alternatively, one method can be nested within another method to provide insight into different levels or units of analysis (Tashakkori & Teddlie, 1998). Or the methods can serve a larger, transformative purpose to change and advocate for marginalised groups, such as women, ethnic racia1 minorities, people with disabilities, and those who are poor (Mertens, 2003). These reasons for mixing methods have led writers from around the world to develop procedures for mixed methods' strategies of inquiry and to take the numerous terms found in the literature, such as multimethod, convergence, integrated, and combined (Creswell, 1994) and shape procedures for research (Tashakkori & Teddlie, 2003). In particular, three general strategies and several variations within them will be illustrated:

1- Sequential procedures, in which the researcher seeks to elaborate on or expand the findings of one method with another method. This may involve beginning with a qualitative method for exploratory purposes and following up with a quantitative method with a large sample so that the researcher can generalise results to a population. Alternatively, the study may begin with a quantitative method in which theories or concepts are tested, to be followed by a qualitative method involving detailed exploration with a few cases or individuals.

2- Concurrent procedures, in which the researcher converges quantitative and qualitative data in order to provide a comprehensive analysis of the research problem. In this design, the investigator collects both forms of data at the same time during the study and then integrates the information in the interpretation of the overall results. Also, in this design, the researcher nests one form of data within another, larger data collection procedure in order to analyse different questions or levels of units in an organisation.

3- Feinberg (2009) summarised the Transformative procedures, in which the researcher uses a theoretical lens as an overarching perspective within a design that contains both quantitative and qualitative data. This lens provides a framework for topics of interest, methods for collecting data, and outcomes or changes anticipated by the study. Within this lens could be a data collection method that involves a sequential or a concurrent approach.

Pragmatism implies that it is necessary to take the multiple perspectives of different groups of real people into account, and to access both quantitative and qualitative data that will help to serve the needs of real people in the future. Pragmatism was therefore the optimal philosophical foundation for this study, because information had to be accessed from multiple sources and perspectives, involving both deductive and inductive methods of interpretation, to help achieve the National Agenda targets in Dubai and the UAE.

Pragmatism recognises the social constructivist viewpoint, that different individuals or groups of participants in a mixed methods study will all have something different to contribute to knowledge and understanding, including not only objective facts but also personal subjective values and perceptions (Feilzer, 2010). The positivist paradigm tends to reject subjective or socially constructed values and perceptions as irrelevant, whereas pragmatism does not (Creswell, 2014).

Research in social science is generally underpinned by the three paradigms of positivism, interpretivism, and pragmatism (Babbie, 2010; Creswell, 2014). Researchers generally adopt only one of these paradigms to guide their actions in a given study. Positivists propose that knowledge is separate from human feelings and consists only of an external objective reality. Positivism involves the collection and statistical analysis of quantitative data, using deductive reasoning, in order to test hypotheses. The interpretivist or constructivist paradigm proposes

that facts and feelings are not separate, implying that knowledge does not exist outside the human mind, but is socially constructed by each individual. Interpretivism involves the collection and analysis of qualitative data, such as observations in natural settings, and the responses of participants to interview questions. Pragmatism, in contrast, assumes that quantitative and qualitative data are complementary and not in opposition. Furthermore, the pragmatist philosophy is beneficial for case studies, involving the exploration of situations in a real-life context (Stiles, 2015).

Because the researcher supports pragmatism, the current study used a mixed methods approach. As a pragmatist, the researcher supports the argument of Bryman (2007) that the polarisation of positivism and interpretivism must be broken down, and that quantitative and qualitative data should be integrated in order to provide a more comprehensive understanding to address the stated research questions.

3.3 This research Methodology

This research will investigate the progress of private schools in Dubai using the National Agenda Parameter (NAPm) towards measuring the achievement of each of these private schools to achieve their targets in TIMSS and PISA tests, and if this will participate in achieving the National Agenda targets for the whole country, which is:

1- In Programme for International Student Assessment (PISA) for UAE to be among the 20^{th} highest performing countries.
2- In Trends in International Mathematics and Science study (TIMSS) for UAE to be among the 15^{th} highest performing countries.

The NAP is an indicator for measuring and monitoring schools' progress towards achieving their individual National Agenda targets. DSIB have inspected and reported for each school's plan towards achieving the National Agenda targets yearly in their schools inspection reports

since the announcement of the National Agenda Policy 2014. In addition to analysis of each school's international tests results, this research studies schools' plans in three academic years 2015-2016, 2016-2017 and 2017-2018, to cover the period from the beginning of the implementation of the National Agenda until the announcement of the latest PISA, TIMSS 2015 and PBTS results in 2017. The perceptions of principals of these schools were collected and analysed to investigate the same issues studied by the NAPm: what are the different practices they have implemented in their schools in relation to teaching strategies, curriculum modification, enhancing students' learning skills and to support their schools with additional resources to achieve better results in TIMSS and PISA. The aim is to answer the following questions:

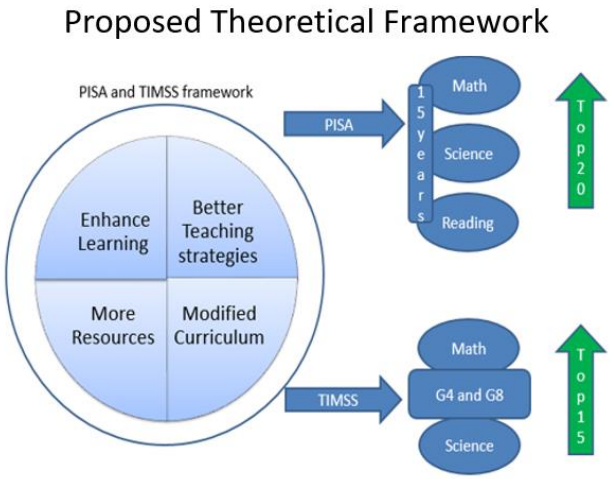
1- Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?
2- Is there any significant difference between the results of Dubai private schools in PISA 2012, 2015 and PBTS 2017 tests?
3- What are the principals' perceptions of the implementation of the National Agenda Policy in their schools?
4- Is there any progress of private schools in Dubai towards achieving the National Agenda targets, in their yearly inspection reports within the years 2015-2016, 2016-2017 and 2017-2018?

UAE aims to be among the highest 20 countries in PISA and to be within the highest 15 countries in TIMSS by 2021, which could impose a big demand on the schools' outcomes, in a country that has recently been founded (in 1971), with an educational system that has only recently started to improve. Guillermo and Tamara (2016) mentioned that international assessment, especially PISA and TIMSS, has played an increasingly important role in

educational policy. These international tests generate valuable information about each country's performances. In addition, Morgan (2016) explained that many scholars have examined the global effect of PISA in several countries; few have explored its effect on sub-national level. Sebeer (2013) emphasised the importance of TIMSS in making a turn towards an evidence-based educational policy.

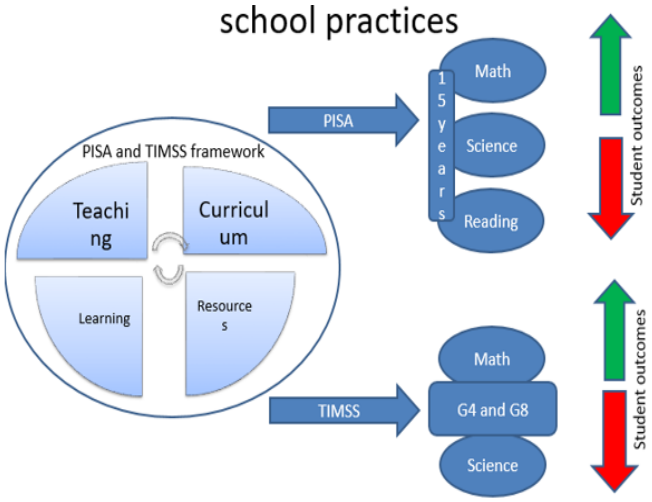
The study's theoretical framework was based on three different concepts, which are the path dependence theory, the institutional change theory and policy learning theory. While, the conceptual framework used to support this research was based on Dale's (2000) theory of globalisation 'Global Structured Agenda for Education' and the adaptation of PISA and TIMSS frameworks, the conceptual framework of this thesis was formulated based on the model in Figure 2.2 in the previous chapter (reproduced below). In this model, the PISA and TIMSS results will depend on the school's practices, which is affected by one or more of the four different components, which are: teaching strategies, curriculum modifications, students' learning and school resources.

Figure 2.2 Consistent schools' practices of the TIMSS and PISA framework will lead to consistent outcomes



While Figure 2.3 from the previous chapter shows the inconsistent approaches of the schools for the development of one or more of the above four components to improve schools' progress towards achieving the National Agenda targets, Figure 2.3 shows the inconsistent effect and hence the inconsistent results in PISA and TIMSS.

Figure 2.3 Inconsistent schools' practices of the PISA and TIMSS framework leads to inconsistent outcomes



Hence, the current study used a mixed methods approach. As a pragmatist, data should be integrated in order to provide a more comprehensive understanding to address the stated research questions.

In this research, a mixed method approach is used by collecting, mixing and analysing quantitative and qualitative data (Creswell 2003). The strengths of the mixed method research are:

- It clarifies and explains the relationships found between the research's variables.
- Once the important variable is identified the relationships between research variables of a large number of individuals is explored in depth and correlated with others.
- This method helps to confirm, or cross-validate, relationships discovered between variables especially when the quantitative and qualitative methods are compared to

triangulate on a single interpretation of a phenomenon. Otherwise, an investigation for the reasons as to why the triangulation is not happening is checked.

On the other hand, the weaknesses of the mixed methods are:

- It is time-consuming and expensive to be implemented.
- Many researchers show their expertise on only one type of research, either the quantitative or the qualitative (Fraenkel & Wallen, 2009).

In this research, a quantitative empirical research was conducted to examine the proposed effective difference of the PISA assessment between the years of 2012 and 2015; in addition to PBTS 2017 results on student outcomes in the selected sample of private schools in Dubai; and which of the three skills has the significance difference: maths, science or reading. Also examined were the TIMSS results for another sample of schools between the years of 2011 and 2015 to discover if there are any significance differences among grade 4 and grade 8 and which skill has significance difference maths or science. Another quantitative instrument was used to analyse the perceptions of principals of the private schools in Dubai, to investigate what are the different practices they have implemented in their schools, in relation to: teaching strategies, curriculum modification, enhancing students learning skills and to support their schools with additional resources to achieve better results in TIMSS, or PISA, or PBTS. The qualitative method was used to analyse the selected schools' National Agenda Parameter section in the inspection reports which was published by the KHDA/DSIB for the academic years 2015-2016, 2016-2017 and 2017-2018 to check these schools achievements towards the National Agenda targets.

3.3.1 Triangulation

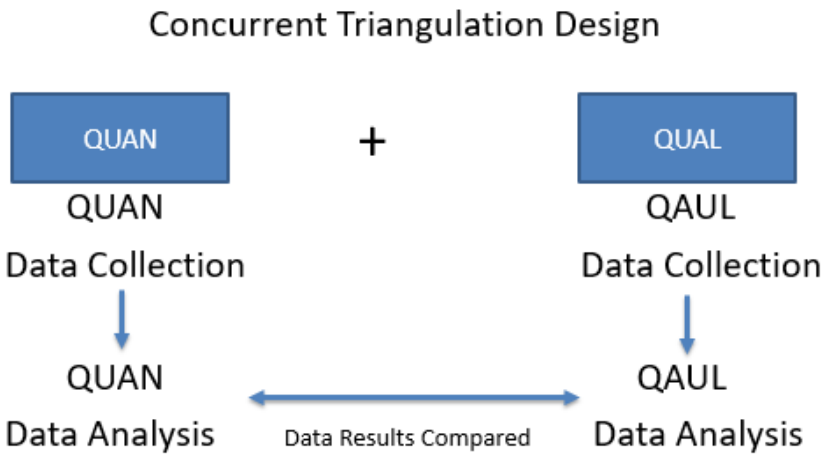
Triangulation or methodical triangulation as mentioned before is used with different methods to study the same research questions. If the results of the two methods are in agreement, this

will help validate the finding of each method. Denzin (1978) was the first to use this type of triangulation method when he utilised multiple data sources to study the same phenomenon, while Jick (1979) discussed the use of triangulation within a single method, quantitative and qualitative, and across both methods. Hence, in the triangulation design the quantitative and qualitative methods will complement each other and limit the weakness of each one of them.

Consistent with the pragmatist paradigm, the researcher believes that a combination of both quantitative and qualitative data would provide the evidence required to make recommendations for achievement of the National Agenda targets. Consequently, triangulation was needed to test the validity of the findings. Triangulation involved identifying and interpreting commonalities or convergences (i.e. consistent agreements among the participants) and discrepancies (i.e. consistent conflicts of opinion among the participants). If data collected using both quantitative and qualitative tools are found to be consistent, then the researcher has objective evidence to conclude that the findings may be credible and dependable (Creswell, 2014). Triangulation was used in this study to improve the validity of the findings by comparing data collected from multiple sources. With regard to research in education, triangulation usually refers to comparison of data collected using three or more methods, such as questionnaires, document analysis and difference with TIMSS, PISA and PBTS results (Denzin, 1997). Triangulation is generally used in educational research to overcome the weaknesses and biases which may arise from the use of only one method. If the results obtained using different methods lead to the same outcomes then the outcomes are more likely to be valid (Fraenkel & Wallen, 2010). Patton (2002), promoted triangulation for programme evaluation in order to strengthen a study by combining methods. This can mean using several kinds of methods or data, including using both quantitative and qualitative approaches; however, the idea of triangulation using different

methods was challenged by Barbour (1998), who argued that each method has its own assumptions in terms of theoretical frameworks that researchers bring to bear on their research. Frankel and Wallen (2009) mentioned that a researcher can choose one of the three designs related to the work with the mixed-method. The design that is related to the mixed-method is called the concurrent triangulation design, which is the basis for this research. Figure 3.1 describes when the researcher uses both quantitative and qualitative methods with different strategies, as required to study the same phenomenon, to determine if the two methods lead to a single understanding of the research problem being investigated and answer the research questions. If they do not, then the researcher must explore why the two methods provide different pictures.

Figure 3.1 Concurrent triangulation design based on one type of a mixed-method design

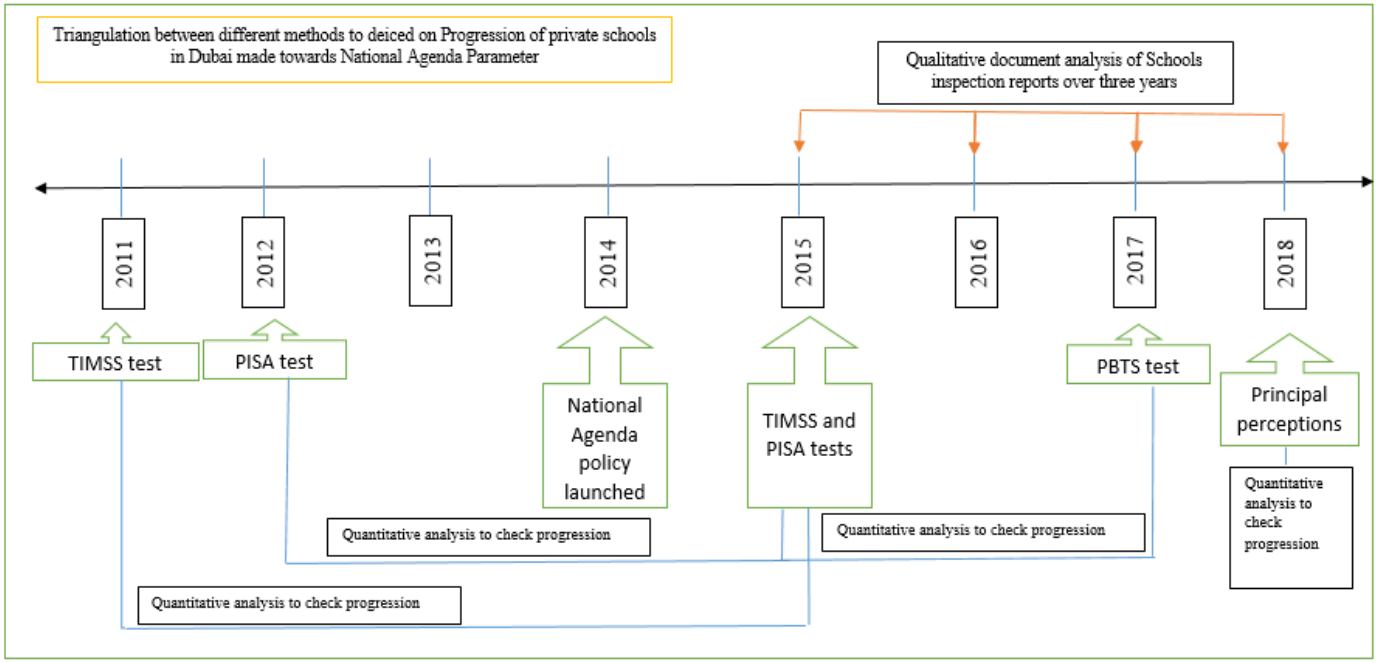


The researcher therefore presents the following justification for using mixed methods. The mixed method approach was appropriate because the research questions were very demanding, and required a broad methodology, involving the use of a wide range of tools. Mixed methods was justified to expand the scope and breadth of this study by using different tools to address the research questions based on data collected from multiple viewpoints. The use of mixed methods in this study followed Fraenkel & Wallen (2010), who suggested that educational

research increasingly is, and should be, a mixture of quantitative and qualitative approaches and that research in education should ask a variety of questions, move in a variety of directions, encompass a variety of methodologies, and use a variety of tools. Moreover, the mixed methods approach should make this study more credible because it represents the phenomenon more completely (Yoshikawa et al., 2008).

Figure 3.2 shows all the research activities in relation to the timeline and the type of analysis used for each activity.

Figure 3.2 Research activities related to the timeline and type of analysis



3.4 Research context

In 2014, His Highness Sheikh Mohammad Bin Rashid Al Maktoum, Vice-President and Prime Minster of UAE, and Ruler of Dubai, launched the UAE National Agenda policy wherein the UAE should be among the most successful countries in providing world-class education (UAE Vision, 2021). This research is conducted on a sample of Dubai private schools. KHDA/DSIB is the regulation and monitoring body for the private schools in Dubai. After each year's

inspections, they issue an inspection report for each school in Dubai, and within this report is a section that focuses on the improvement of the school towards meeting the National Agenda targets and achieving the UAE's targets, or whether the school exceeded it or did not meet the NA target. Dubai has 185 private schools with 17 different curricula, with around 280,000 students from 180 nationalities (Dubai Private Schools: A decade of growth key findings 2008 -2018). In TIMSS 2011 private schools in Dubai participated in this test including schools using the following curricula: Ministry of Education (MoE), United Kingdom (UK), United States (US), Indian, International Baccalaureate (IB), Philippine and Pakistani. The range of schools sampled for the assessments reflect the diversity of Dubai's population. In total, 6,443 students in Grade 4 sat for the assessment and 5,571 students from Grade 8. The advanced statistical technique required to sample students was overseen by the International Association for the Evaluation of Educational Achievement (IEA) to ensure strict adherence to representative sampling in each curriculum. In TIMSS 2015, 7,453 Grade 4 students were sampled, which is a 15.7% increase from 2011, when 6,443 students participated. In Grade 8, 6,149 students sat for the assessment, which is a 10.4% increase from the 5,571 students who were sampled in 2011 (Towards Achieving a First-Rate Education in the UAE, 2017).

Dubai participated in PISA 2012 within the UAE's sample. Participation in PISA reflected the diverse mix of schools forming Dubai's educational system. 4,974 students were selected across the schools; Dubai chose to include all eligible schools in PISA 2012. Eligible schools are those that offer education to students at age 15 and where the language of instruction is either English or Arabic. By involving the greatest possible number of schools, the Emirate ensures representative information is gained from its participation. In addition, this allows the majority of schools in Dubai to benchmark their students' proficiency as well as the factors associated with improving learning outcome. In PISA 2015, 6,798 students from Dubai private schools

participated in this assessment. (Benchmarking the Education of 15-year-old Students in the UAE to International Standards, 2017).

3.5 Participant selection

Teddlie and Tashakkori (2009) and the work of Teddlie and Yu (2007) indicate that it is commonplace for mixed methods research to use more than one kind of sample (probability, non-probability). Also, to use samples of different sizes, scope and types (cases; people; materials; written; oral observation; other elements in social situations: locations, times, events, etc.) within the same piece of research. Teddlie and Tashakkori (2009) commend the use of purposeful random sampling, in which the researcher takes a random sample from a small number of cases from the population (a probability sample) that has already been drawn from a purposive sample (where the population has been chosen for a specific purpose).

In this research, the schools' results were selected by purposive sampling. Purposive sampling was used as a deliberate attempt to sample specific groups or individuals so that the sample was representative of the group or type of individual (Anderson & Burns, 1989). The selected sample for this research was different based on the number of schools that participated in each test and that of their inspection reports for the different academic years 2015-2016, 2016-2017 and 2017-2018 (found on the KHDA website). The sample was of schools that participated in the PISA assessment for the last two rounds, 2012 and 2015, and PBTS 2017 test, and a sample of schools that participated in the TIMSS assessment for the last two rounds, 2011 and 2015 (KHDA School Inspection - Key Messages (2016)). Sample schools were selected from the TIMSS list of schools that are similar to the schools that have participated in the National Agenda inspection visits in the years 2015-2016, 2016-2017 and 2017-2018. The selection of the same number of schools for the PISA and TIMSS analysis of results is just to make the results comparison easy. The selection of the sample was based on the following criteria:

1- The school should have results for TIMSS 2011 and 2015 tests.
2- The school should have results for PISA 2012 and 2015 tests.
3- The school should have results for PBTS 2017 test.
4- The school should have three rounds of inspections reports for the years 2015-2016, 2016-2017 and 2017-2018 to be downloaded from the KHDA website.

The selected sample schools will participate in the analysis of the quantitative and qualitative data if the school met the previous criteria. Table 3.4 shows the actual population for this research and the sample schools selected for each of the quantitative analyse for either the TIMSS 2011 and 2015 for grades 4 and 8, and PISA 2012 and 2015, and PBTS 2017 results. This was the same number of schools selected for the qualitative analysis for the inspection reports for schools that participated in TIMSS, PISA and PBTS.

Table 3.4 Research population for TIMSS, PISA and PBTS results in correlation with inspection reports

Criteria	Number of schools	Number of schools with Inspection reports 2015-2016	Number of schools with Inspection reports 2016-2017	Number of schools with Inspection reports 2017-2018
Schools with TIMSS 2011 grade 4 results	106	106	102	106
Schools with TIMSS 2011 grade 8 results	93	82	77	91
Schools with TIMSS 2015 grade 4 results	106	106	102	106
Schools with TIMSS 2015 grade 8 results	93	82	77	91
Schools with PISA 2012 results	95	84	79	93
Schools with PISA 2015 results	95	84	79	93
Schools with PBTS 2017 results	87	76	69	85

Table 3.5 represents the sample of schools selected for TIMSS, PISA and PBTS results in correlation with their school reports, where the results of the same school and the inspection school reports over the three academic years exist on the KHDA website.

Table 3.5 Sample selected for TIMSS, PISA and PBTS results in correlation with inspection school reports

Criteria	Number of sample schools (percentage)
Total number of schools selected for TIMSS grade 4 2011 and 2015 tests also having school inspection reports for the three academic years 2015-2018	78 (78/106=74%)
Total number of schools selected for TIMSS grade 8 2011 and 2015 tests also having school inspection reports for the three academic years 2015-2018	70 (70/93=75%)
Total number of schools selected for PISA 2012 and 2015 results also having school inspection reports for the three rounds 2015-2018	68 (68/95=72%)
Total number of schools selected for PISA 2015 and PBTS 2017 results also having school inspection reports for the three rounds 2015-2018	65 (65/87=75%)

This research analyses the results of the sample schools for PISA 2012 and 2015 and PBTS 2017 in addition to TIMSS 2011 and 2015 rounds the selection of these two rounds, to check the influence the National Agenda Policy, that started implementation in schools in the academic year 2014-2015. The analysis was implemented through a quantitative method, to identify which of the schools have significance difference between the PISA 2012 and PISA 2015 results in the three domains math, science and reading skills. In addition, explains if there is significant difference between the 2011 and 2015 TIMSS results in the math and science skills for grade 4 and grade 8.

A quantitative analysis was conducted to test if there were any proposed significant improvements in the results of either PISA, PBTS or TIMSS in the last two cycles for the above curricula in the schools. Then a qualitative analysis of DSIB inspection reports for these schools for the academic years 2015-2016, 2016-2017 and 2017-2018 was checked on what different changes these schools have implemented in curriculum modifications, teaching strategies, students learning skills, and addition of resources so that they can perform better in the National Agenda Parameter. Finally, an online survey to check the perspective of the school principals was administered, to check what strategies they have used with regards to meeting the National Agenda targets. This survey consisted of questions on the schools' teaching strategies,

curriculum modification, students' learning skills and addition of resources to improve students outcomes in relation to PISA, PBTS and TIMSS assessments.

3.6 Instruments

A mixed method approach was used by collecting, mixing and analysing quantitative and qualitative data (Creswell 2003). The proposed difference was compared the PISA 2012 and 2015 results for maths, science and reading skills, and PBTS. In addition, the proposed significance difference between TIMSS 2011 and 2015 in both grade 4 and grade 8 for math and science skills was identified.

An online survey to collect Dubai private school principals' perspectives was conducted. This survey was to collect the information regarding what schools have changed in their teaching strategies, curriculum modification, improving students' learning skills and improvement of resources. The results obtained above, and finally in the analysis of these schools' inspection reports, will lead to a triangulation of the results of the different methods used to give a single understanding of the research problem being investigated and answer the research questions.

Table 3.6 represents the different research questions, the type of participants, the samples size, the instrument, and the approach design used.

Table 3.6 Represents the different research questions, the type of participants, the sample size, the instruments and the approach design of this research

Research questions	Participants	Sample size	Instrument	Approach
Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?	All Private Schools in Dubai	78 schools for Grade 4 and 70 schools for Grade 8	Independent t-test and ANOVA tests using SPSS program.	Quantitative

Is there any significant difference between the results of Dubai private schools in PISA 2012, 2015 and PBTS 2017 tests?	All private schools in Dubai	68 schools for PISA 2012 and 65 schools for PISA 2015 and PBTS 2017	-Independent t-test and ANOVA tests using SPSS program. - In addition to statistical analysis of the results.	Quantitative
What are the principals' perceptions of the implementation of the National Agenda Policy in their schools?	All private schools principals in Dubai	110 principals	Analysis of -Likert scale and open ended questions	Quantitative
Is there any progress of private schools in Dubai towards achieving the National Agenda targets, in their yearly inspection reports within the years 2015-2016, 2016-2017 and 2017-2018?	The sample schools selected	According to number of the tested schools for each test	Inspection reports analysis for the three years 2015-2016, 2016-2017 and 2017 – 2018. using NVIVO program	Qualitative

The use of the mixed method with the concurrent triangulation approach for the different analysis instruments on the selected samples will lead to answers for the different questions.

3.6.1 Quantitative method

Creswell (2008) defined a quantitative method as a means for testing objective theories by examining the relationship among variables. These variables, in turn, can be measured, typically on instruments, so that numbered data can be analysed using statistical procedures. A descriptive exploratory approach was used to analyse the survey data. The frequency distributions of the responses to each item were analysed in order to address the research questions. All the survey responses were categorical, meaning that they consisted of responses partitioned into predefined categories; the respondent had to choose one or more items from a list of given items (Field, 2011). The frequencies (counts and percentages) of the responses to each question were tabulated.

3.6.1.1 Independent *t*-test and ANOVA test

The independent *t*-test is a statistical test used to determine whether the difference between the means of two groups is statistically significant. ANOVA test or One-Way Analysis of variance is a statistical test used to compare two or more group means. An alternative name is the *F*-test (Johnson & Christensen, 2008).

This study uses the PISA 2012 and 2015, PBTS 2017 and TIMSS 2011 and 2015 results regarding the selected schools for each of these tests to examine:

- If there is a proposed significance difference between the three scores of literacy math, science and reading in the two rounds of PISA 2012 and 2015. In addition to comparing these results with PBTS 2017 results for the same literacies, which are reading, maths and science.
- In TIMSS assessment if there is a proposed significance difference between the two scores of literacy maths and science in grade 4 and grade 8 in the two years 2011 and 2015.

This analysis was carried out by SPSS 23 software. The first test to be implemented for the PISA, PBTS and TIMSS data set in the two rounds was the *t*-test, to check if there are any proposed significance differences for each school in the two rounds and PBTS 2017 result. In the second test, the ANOVA test for the above data was implemented to check which of the three different domains maths, science and reading has the proposed significance difference in the two rounds of PISA and the PBTS 2017 result. For TIMSS test, to examine which of the two domains maths or science, in grade 4 or in grade 8 has the proposed significance difference in the same school.

3.6.1.2 Statistical analysis of tests results

The difference between the results of each test such as TIMSS 2011, 2015 or PISA 2012, 2015 and PBTS 2017 was calculated, the number of schools that have improved (positive difference) and the schools that have dropped (negative difference) was counted. The difference between each test result and the set target by KHDA for each school was also calculated for each test and divided into two groups, one for those that had achieved and exceeded their targets and another one for those that did not reach their targets. The numbers and percentages were calculated to record comparisons.

3.6.1.3 Principals' survey

A survey is defined as 'an attempt to obtain data from members of a population to determine the current status of that population with respect to one or more variables' (Fraenkel & Wallen, 2010).

The second instrument to be used is the survey. It is a self-report data-collection instrument filled out by the research participants. There are 15 key principles for the construction of surveys

and the main goal of a survey is to understand the opinions of the participants about variables related to the research objectives (Johnson & Christensen, 2008).

The survey questions for the study were developed based on the different categories related to the questions of this research. The questions were mainly closed questions using Likert scale-type answers, with few open-ended questions related to the schools' actions and plans in modifying teaching strategies, curriculum design, students' learning skills, and resources, towards meeting the National Agenda targets. The survey was implemented to collect the information related to the schools from the principals in order to save the time and the efforts of collecting this information by interviewing those principals.

After developing the survey questions, the researcher ensured that the survey questions were valid and reliable for the purpose of the research. Cohen, Manion and Morrison (2011), mentioned that validity of surveys could be seen from two viewpoints (Belson, 1986). First, whether respondents who complete the survey do so accurately, honestly and correctly; and second, whether those who fail to return their surveys would have given the same distribution of answers as did the respondents. The question of accuracy can be checked by means of a 12 principles tactic that includes familiarisation, temporal reconstruction, probing and challenging. One central issue in considering the reliability and validity of surveys is that of sampling. An unrepresentative skewed sample, one that is too small, can easily distort the data, and indeed, in the case of very small samples, prohibit statistical analysis (Morrison, 1993). Validation was conducted by piloting the survey to randomly selected principals at five schools, before administering it to the principals of all private schools in Dubai. The feedback from the pilot study was used to revise the survey.

A descriptive exploratory cross-sectional survey was administered. The general aim of a descriptive exploratory survey is to describe the status, behaviours, perceptions, attitudes,

experiences and other characteristics of a target population with respect to a particular service, product, or issue (Babbie, 2010). The fundamental characteristics of the current exploratory survey were that:

1- the principals were asked to respond to a series of self-report survey items;
2- the responses provided descriptive information about the research contexts, without changing their environment; and
3- the researcher did not assign the participants into groups, nor was any part of the environment manipulated by the researcher.

To conduct a survey for the current study an internet link was distributed to Principals of private schools in Dubai. A copy of the survey is provided in appendix 1.

The survey consisted of open-ended and closed items, which were divided into three sections. The items were grouped into dimensions according to the research questions:

- Section 1 elicited demographic information about the participants.
- Section 2 consisted of closed items and some open items about their National Agenda awareness, and
- Section 3 concerned the school's practices in modification of curriculum, teaching practices and students' learning skills in this context.

When conducting an evaluation of educational programmes, it is essential that the researcher align the stated research questions directly to the questionnaire items used in the survey (Fraenkel & Wallen, 2010).

Table 3.7 lists the items in the survey that were specifically designed to elicit responses to address: What are the principals' perceptions on the implementation of the National Agenda Policy in their schools?

Table 3.7 Survey Items (closed and open) designed to address principal's perceptions about NAP

Question
8- Has the school participated in all benchmark tests?
9- Were the curriculum benchmark tests used aligned to your curriculum?
10- What was the percentage of students who have participated in the school benchmark tests in the last academic year 2017-2018?
14- Do you think that the school effectively promotes the awareness and understanding of the National Agenda targets among students, parents, teachers and owners?
15- Which of the different school stakeholders do you think are not effectively aware of the school's National Agenda target?
16- Has the school effectively modified its curriculum to be aligned to PISA, TIMSS and PBTS framework?
19- Are the National Agenda targets included in the school development plans?
20- Where can you observe the modification of the curriculum to meet the National Agenda framework?
22- Are the National Agenda targets included in the departmental development plans?
23- What questioning styles are your teachers implementing with your students in lessons of the different subjects?
24- What learning skills do your students demonstrate when they are in lessons?

Table 3.8 lists the items in the survey were specifically designed to elicit responses to address the question about if there any progress of private schools in Dubai towards achieving the National Agenda Parameter?

Table 3.8 Survey Items designed to address if any progress made towards NAP

Questions
7- Has the school achieved its National Agenda targets for the last academic year 2017-2018?
11- Did the School meet its National Agenda target in PISA 2015 test (if applicable)?

12- Did the School meet its National Agenda target in TIMSS 2015 test (if applicable)?
13- Did the School meet its National Agenda target in PISA Based Test for schools' test in 2017 (if applicable)?

Table 3.9 lists the items in the survey that were specifically designed to elicit responses to address the question about the challenges for private schools in Dubai in implementing the National Agenda Policy.

Table 3.9 Survey Items designed to address challenges to apply NAP

Questions
17- What would be the challenges and barriers of implementing a modified curriculum for the school to meet the National Agenda targets?
26- Is your school likely to achieve its National Agenda targets by 2021?

A pilot of this survey was administered, for reliability and validity check to five principals selected at random from a sample of private schools in the Northern Emirates. Based on their feedback some of the questions where modified either by adding clarifications or by giving more choices, in addition to adding an option to write the answer and not only to select from the multiple choices. Then the online survey was sent, via an email, to all school principals of the private schools in Dubai to participate in the survey. The researcher through his previous work in DSIB was able to enlist help from the administration team to obtain the emails addresses of all of the private schools' principals, to send them with all the required approval letters from the university to make sure that school' principals will participate in the survey. This turned out to be not possible and this will be explained later. Responses from the principals were; analysed and compared between the different sample schools to check the answers of the different questions and to correlate with other instruments results to answer to research questions.

3.7 Validity

A key issue addressed by quantitative researchers is internal validity, defined as the extent to which the researcher's measurements actually measure what the researcher intended to measure, particularly with regard to the relationships between hypothetical causes and effects (Creswell, 2014). For the purposes of qualitative research, however, the concept of internal validity is redefined in terms of credibility or trustworthiness (Lincoln & Guba, 1985). Credibility implies establishing that the results of qualitative research are believable. Credibility means that the participants involved in qualitative research believe what they say or write is true, because they are the only ones who can legitimately judge the veracity of the findings.

Trochim (2006) added the concepts of transferability and dependability to the assessment of the validity of qualitative data. Transferability refers to whether the findings can be generalised to settings outside the sample schools that participated in this study. Transferability could be threatened because the data and conclusions were derived from relatively few participants working in local settings. Dependability is an assurance that the research accurately observed that which it intended to observe. The dependability of the current study was enhanced by relating the research questions and instruments to a conceptual and empirical framework based on a literature review (Creswell, 2014).

Validity issues were implicated if the respondents provided false answers in the survey, for example, because they had personal feelings to hide, or if there were sensitive issues that they did not want to share (Creswell, 2014). Although it is easy to record what people actually state at one moment in time, it is much more difficult to interpret their underlying feelings, thoughts and intentions at a previous moment in time. To ensure the validity of the data, concurrent triangulation was used to check the data collected. Concurrent triangulation was used to search for consistent patterns across the qualitative and quantitative data in order to improve the validity of the findings; however, quantitative and qualitative data are not always consistent

because the mixed method approach accesses different types of responses from the participants. Quantitative data are based on the positivist paradigm, assuming that facts are not related to feelings, whereas qualitative data are based on the constructivist paradigm, assuming that facts are related to feelings. Triangulation may therefore invite contradiction and tension between the positivist and constructivist approaches to collecting and analysing data (Denzin, 1997; Morse, 1991). Consequently, the perceptions of individuals collected using surveys are not necessarily facts, but are subjective realities, so that what the participants say is not necessarily exactly the same as what they actually believe or do in reality (Willis, 1998). Furthermore, it was not expected that all of the participants would agree about the issues associated with challenges to achieve National Agenda targets, due to their different levels of knowledge and experience.

3.8 Qualitative method

Creswell (2008) defined qualitative method as a means for exploring and understanding the meaning individuals or groups ascribed to a social or human problem. The process of research involves emerging questions and procedures, data typically collected in the participant's setting, data analysis inductively building from particulars to general themes, and the researcher making interpretations of the meaning of the data. Many researchers using qualitative research methods do not describe in sufficient detail as to how they interpreted their data (Babbie, 2010; Creswell, 2014). Consequently, it may be difficult to determine the validity of the conclusions they drawn from qualitative analysis. For this reason, the qualitative methods used to analyse the information obtained using the document analysis in this study are described here in detail. Furthermore, the qualitative analysis involved bracketing, meaning that the researcher attempted to detach his own views from the process of qualitative analysis (Merriam, 2009).

The qualitative data was analysed using content analysis and the Nvivo software. The data were first horizontalised, assuming that all of the statements had equal value. After conducting a

critical review of the text, irrelevant information was excluded, including the names of the participants, to ensure that their right to confidentiality was respected. The content analysis was based on the constant comparison method, as described by Burns (2000), and Leech and Onwuegbuzie (2007), in which the material was coded into themes. The units of the content analysis were the responses of each participant to the survey questions. These responses were recorded and were entered into the content analysis in full. The responses were not summarised, slanted, or distorted, and the researcher avoided subjective interpretation of their meaning. This strategy ensured that the responses of the participants were included in their entirety, and all were given equal weight.

Each primary theme represented a separate issue, topic, concept, or proposition. The four research questions and their corresponding themes were identified prior to the content analysis. Consequently, a top-down or a priori approach (i.e. identifying the units of analysis which corresponded to each primary theme) was applied. A natural classification of sub-themes occurred with each theme, based on the phrasing of the research questions. The coded categories were then grouped by similarity, and a theme was identified based on each grouping.

3.8.1 Document Analysis

Documents once found and examined do not speak for themselves but require careful analysis and interpretation (Cohen, Manion & Morrison, 2013). The National Agenda Parameter section in the KHDA/DSIB inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018 were analysed for each of the participating schools in the different tests. The focus of the analysis of these reports for the three consecutive years was mainly to compare the progress of these schools in the categories of the framework for the National Agenda Parameter and to discover what the schools have been doing to improve their practices to check the school progress towards the following actions:

Table 3.10 compares the main research themes with the findings of the themes in the reports analysis for the three academic years 2015-2016, 2016-2017, 2017-2018.

Table 3.10 Compare research themes with finding themes

Research Themes	Finding Themes
1-What actions the school have taken to improve and modify their curriculum.	2-National Agenda requirements 3-Lesson and curriculum planning
2-What practices teachers especially in maths, science and reading are using in their classrooms to include critical thinking, research and investigation skills.	4-Teaching and teaching strategies 1-Assessment tests and use of data
3-What is the students learning, and how students are developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? 4-What additional resources the schools have purchased to support the changes in teaching strategies.	5-Students learning skills

The researcher chose this instrument to collect the information regarding these schools' development plans and modifications, because these reports are published from an independent governmental organisation in Dubai that monitors the schools' performance and which gives an inspection report about each schools' performance over-all and especially, the school's progress towards achieving the National Agenda Parameter. Another issue that the triangulations of results will lead to; is the influence of the different schools' curricula on the successful implementation of the National Agenda policy and hence what differences occur among students' performances in the different tests, PISA, TIMSS and PBTS.

Once all of the above data was collected and analysed from the different schools using different instruments, the findings were compared with the schools' overall results in TIMSS, PISA and

PBTS to check if these practices had caused any changes. Then, to the correlation with the principals' surveys and response analysis of these measures to have an effective overall school progress towards the National Agenda targets.

3.9 Ethical Considerations

Ethical considerations are of particular concern to the planning and execution of educational research which involves making decisions that are going to affect the lives of other people. (Cohen et al., 2007). Consequently, the researcher was bound by codes of good conduct, concerned with addressing moral questions of right and wrong. There are three broad areas of ethical concern to researchers working in social settings: first, the ethics of data collection and analysis; second, the ethics of the treatment of participants; and third, the ethics of responsibility to society (Singleton & Straits, 2005). Ethical data collection and analysis, involved adherence to codes of good conduct for the observation, processing, and reporting of findings, including the avoidance of plagiarism, mistakes, negligence, and fraud. The ethical treatment of participants involved the observance of codes of good conduct designed to ensure that participants were protected from physical or psychological harm, discomfort, and danger. Ethical treatment ensured the welfare of the participants and required adherence to formal codes of practice associated with risk assessment, informed consent, privacy, confidentiality, and deception.

The ethical guidelines of the British University in Dubai (BUiD) were followed. Because the study includes human subjects, an application was submitted to the BUiD Review Board for approval. (A copy is attached at appendix 2.) A code of practice was created specifically for this study to resolve possible ethical issues. The main principles of the code of practice used in the current study were derived from Marshall and Rossman (2011), requiring respect for persons, beneficence and justice. Respect for person implied that participants' rights and dignity

were respected and that the researcher was aware of his professional and scientific responsibilities to society and to the specific communities where they lived and worked. Beneficence implied that this study did not pose any physical risk to the participants nor did it apply any unethical techniques, such as fraud, subterfuge, or intentional misrepresentation of fact. Justice implied that the researcher attempted to reduce bias to the minimum, and any risks to the participants were balanced by the beneficial outcomes of the research to society.

The code of practice also followed the Social Research Association's (2003) recommendation that the researcher must strive to protect subjects from undue harm arising as a consequence of their participation in research. The subjects' participation should be voluntary and as fully informed as possible and no group should be disadvantaged by routinely being excluded from consideration.

The ultimate goal of this study was to provide recommendations to help in the achievement of the National Agenda in Dubai and the UAE. Because the researcher ostensibly applied ethical principles to collect, analyse, interpret, and report the findings, then it is suggested that all educational parties such as KHDA should be able to trust the conclusions of this study, and implement the recommendations with impunity. Ethics is the principles that help us uphold the things we value. For research, it is a set of principles developed to guide and assist researchers in conducting ethical studies (Johnson & Christensen, 2008).

The researcher has previous experience of seven years working with DSIB as a Senior Inspector and part of his work involved visiting schools and conducting meetings through the inspection visits with different stakeholders regarding the schools' developments plans and their actions to achieve their targets towards meeting the National Agenda. The previous work of the researcher did not affect any type of data collected nor create any bias. The researcher, as part of his previous work, signed a code of conduct agreement with DSIB/KHDA where the

researcher will not have any conflict of interest relationship with any of the private schools in Dubai, and hence his work will be completely unbiased. In addition, a team of at least six other inspectors conducts the inspection visits to private schools. The team will reach their judgments about the school through a team discussion and not an individual decision.

A letter was provided by the university regarding the research and the type of information requested that will be shared by the DSIB. All of these letters in addition to the link for the online survey were sent by email to all schools so that their principals could complete the survey. It was mentioned in the introduction letter of the survey link sent to the schools that participants in this research will be protected and their privacy and secrecy maintained. In addition, the survey did not ask any questions that could identify the participants (name of participant or school's name). Even when analysing the PISA, PBTS and TIMSS results for the sample schools there was no mentioning of any school name. The participants were also made aware of the purpose, audience and contents of the proposed research. This was mentioned in the introduction letter of the survey link, in which the participants were notified about the main purpose of this research and who are the participants and what were the objectives of this research. The participants were given the right to opt out anytime during the process of the research (see Appendix 1).

3.10 Limitations

In conducting any research study, some limitations may face the researcher. In this study, responses from the principals of the selected sample private schools were requested in an attempt to make the participation rate for this survey high. In addition, the proposed difference when analysing the PISA, PBTS and TIMSS results could potentially not lead to the positive difference required to support this study, in which case other reasons could be influencing the improved National Agenda Parameter for the school. Another limitation could be that the school

is achieving its National Agenda target but that this is not reflected on the proposed difference between PISA or TIMSS results in the latest two rounds. The fourth limitation was the researcher's background and career as a school inspector. The use of interpretivism within the context of a qualitative analytical strategy implies that the researcher must be reflexive (Finlay, 2002; Holland, 1999). Reflexivity meant that it was necessary for the researcher, as a stakeholder with a professional interest in education in UAE, to be aware of the role he played in constructing knowledge, and to explain how and why he came to certain conclusions. The validity of the content analysis depended on the researcher's integrity to report the results accurately. For the purposes of this study, the researcher tried to interpret the responses of the participants without bias. He did not give preference to the responses of certain participants, which agreed with his own personal views, nor did he exclude any responses that were directly opposed to his own personal views. As a stakeholder, nevertheless, the researcher found it difficult to take a neutral stance. His personal viewpoint could potentially lead him to focus on certain aspects more than others. In order to avoid bias, the researcher was self-critical, in order to ensure the validity of the data and the conclusions, as well as adhering to the ethics guideline obtained from and approved by the university. The fifth limitation was the time line. Mixed methods studies require a considerable amount of time and effort to complete successfully (Creswell, 2014) and the limited time line was a challenge. The data collection began from the very first week back after a schools' break, and obtaining approval and collecting data from all the principals, who were busy preparing activities for the new academic year, took a long time to complete. Which had effect on delaying the time of the start of the study beyond what was planned.

3.11 Chapter summary

In this chapter, an explanation of research approaches in general and then the research approach of this research was given in detail, with an explanation of the pragmatism approach and the mixed-method approach. Concurrent triangulation was explained as a checking tool for the different analysis research tools. An explanation of the research context, the selection of the research participants and the research sample was identified. The research instrument tools used for the analysis of the data collected were identified as the quantitative and qualitative. The TIMSS 2011, 2015 results, PISA 2012 and 2015 results and PBTS 2017 results were collected in addition to the private school principals' perceptions collected by the researcher's designed survey. The school inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018 for each school were analysed qualitatively. The research validity and ethical considerations were explained in the last two sections of the chapter.

CHAPTER 4: Results

4.1 Introduction

The previous chapter explained the method used, which is the mixed method using concurrent triangulation for the different quantitative and qualitative data analysed to provide answers for this research. The way the research sample was selected and the different types of data collected were explained.

The purpose of this chapter is to analyse the research data and present the findings of the research. Table 4.1 shows the actual number of the selected sample for this research from the collected data, for the TIMSS 2011, 2015 and PISA 2012 and 2015 and PBTS for 2017 results in addition to, the number of principals who participated in the survey.

Table 4.1 Samples selected for this research

Criteria	Number of sample schools
Total number of schools selected with TIMSS grade 4 2011 and 2015 tests results in addition to school inspection reports for the three academic years 2015-2018	78
Total number of schools selected with TIMSS grade 8 2011 and 2015 tests results in addition to school inspection reports for the three academic years 2015-2018	70
Total number of schools selected with PISA 2012 and 2015 results in addition to school inspection reports for the three rounds 2015-2018	68
Total number of schools selected with PISA 2015 and PBTS 2017 results in addition to school inspection reports for the three rounds 2015-2018	65
Total number of principals who participated in the survey	24

This research uses a mixed method approach and uses triangulation to check the findings. The research context, the selection of the participants and the instruments used to analyse the data that were collected have been discussed, including:

1- Quantitative methods analysis of the TIMSS, PISA and PBTS results using independent t-test and ANOVA test, statistical analysis of test results and finally the principals' survey.
2- Qualitative methods analysis of the school inspection reports for each school over the three academic years 2015-2016, 2016-2017 and 2017-2018.

This research investigates the progress of private schools in Dubai using the National Agenda Parameter (NAP) towards measuring the achievement of each of these private schools to achieve their targets in TIMSS and PISA tests. Hence, this will participate in achieving the National Agenda targets for the whole country, which is:

1- In Programme for International Student Assessment (PISA) for UAE to be among the 20^{th} highest performing countries.
2- In Trends in International Mathematics and Science study (TIMSS) for UAE to be among the 15^{th} highest performing countries.

In addition to the analysis of each schools international tests results, the purpose of this research is to study the progress of the private schools in Dubai towards achieving the National Agenda policy. This will be through studying of schools' inspection reports in each of three academic years, 2015-2016, 2016-2017 and 2017-2018, to cover the period from the beginning of the implementation of the National Agenda until the announcement of the latest PISA, TIMSS 2015 and PBTS results in 2017. The perceptions of principals of these schools have been collected and analysed to investigate the same issues studied by the NAP, such as: what are the different practices schools have been implementing in relation to teaching strategies, curriculum modification, enhancing students' learning skills and to support their schools with additional resources to achieve better results in TIMSS, PISA and PBTS. The questions for this research to answer are the following:

1- Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?
2- Is there any significant difference between the results of Dubai private schools in PISA 2012, 2015 and PBTS 2017 tests?
3- What are the principals' perceptions on the implementation of the National Agenda Policy in their schools?
4- Is there any progress of private schools in Dubai towards achieving the National Agenda Parameter, in their yearly inspection reports within the years 2015-2016-2016-2017 and 2017-2018?

A statistical analysis of PISA, TIMSS and PBTS tests results was conducted using SPSS 25 software.

Firstly, an Independent t-test analysis to know which of these have significance difference among the following:

1- 2011 and 2015 TIMSS and grade 4 and 8,
2- 2012 and 2015 PISA,
3- PISA 2015 and PBTS 2017.

Secondly, an ANOVA test between the same groups has been implemented to check which of the different domains (maths, science or reading) will has the biggest influence.

Thirdly, further quantitative statistical analysis has been conducted on the principals' surveys data.

Finally, a qualitative analysis will be conducted on the school inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018 through a document analysis method using NVivo 12 software on the following samples:

1- inspection reports for schools that participated in TIMSS 2011 and 2015 rounds

2- inspection reports for schools that participated in PISA 2012 and 2015 rounds, and
3- finally, inspection reports for schools that participated in PISA 2015 and PBTS 2017 rounds.

The types of collected data and the method of analysis used for each of them are shown in Table 4.2:

1- TIMSS results 2011 and 2015 for the selected sample of private schools in Dubai and their inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018.
2- PISA results 2012 and 2015 for the selected sample of private schools in Dubai and their inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018.
3- PBTS results 2017 for the selected sample of private schools in Dubai and their inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018.
4- Surveys from the principals' of the private schools in Dubai about their readiness to meet National Agenda targets.

Table 4.2 The different data types for this research and the method of analysis used for each of them

Data Collected	Type	Methods on Analysis
TIMSS results 2011 and 2015 for the selected sample of private schools in Dubai for G4 and G8	Quantitative	1-Statistical analysis 2-t-test analysis 3-ANOVA test analysis
PISA results 2012 and 2015 for the selected sample of private schools in Dubai	Quantitative	1-Statistical analysis 2-t-test analysis 3-ANOVA test analysis
PBTS results 2017 for the selected sample of private schools in Dubai.	Quantitative	1-Statistical analysis 2-t-test analysis 3-ANOVA test analysis
Principals' surveys of the private schools in Dubai about their readiness to meet National Agenda targets	Quantitative	1-Statistical Analysis
DSIB inspection reports for private schools in Dubai over three inspection academic years, for the years 2015-2016, 2016-2017 and 2017-2018	Qualitative	1-Document analysis

4.2 Statistical analysis of TIMSS, PISA and PBTS results

4.2.1 Statistical analysis of TIMSS results

In 2014, KHDA gave each school an internal National Agenda target for the different domains of maths, science and reading; this target was for TIMSS 2015 and PISA 2015 expected results based on each school's results in TIMSS 2011 and PISA 2012. The targets were appropriate to each school's outcomes, curriculum modification, teaching strategies adopted and the range of resources available for students learning.

For each test, the difference between the results of the last round and the round before is calculated; if the difference is negative this indicates a drop from the last round, and if the difference is positive this indicates an improvement from the last round. The overall difference is calculated. Based on this overall number, whether it is negative or positive, the school is considered to have dropped or to have improved from the last round.

Table 4.3 shows the number of schools that have positive and negative differences in the results between TIMSS 2015 grade 4 and 8 and TIMSS 2011 grade 4 and grade 8 in math and science for (78) schools and (70) schools respectively.

Table 4.3 The number and percentage of schools that have improved and not improved between the rounds of TIMSS 2015 and 2011 for grades 4 and 8 in maths and science

Category	(+) Positive Difference between TIMSS 2015 and TIMSS 2011 results (%)	(-) Negative Difference between TIMSS 2015 and TIMSS 2011 results (%)
Number of schools in Grade 4 maths	69 (88%)	9 (12%)
Number of schools in Grade 4 science	70 (90%)	8 (10%)
Number of schools in Grade 8 maths	56 (80%)	14 (20%)
Number of schools in Grade 8 science	59 (84%)	11 (16%)

Table 4.3 shows that (88%) of the schools that have improved their TIMSS results between 2011 and 2015 in grade 4 for maths domain and (90%) for the science domain. It also presents that (80%) of the schools have improved in grade 8 for maths and (84%) for science.

Table 4.4 shows the difference between the TIMSS 2015 results and each school target for the TIMSS grade 4 and 8 for math and science domains.

Table 4.4 The number and percentage of schools that have improved and not improved between TIMSS 2015 results and each of the school targets for grades 4 and 8 in maths and science

Category	(+) Positive Difference between TIMSS 2015 and each school's targets results (%)	(-) Negative Difference between TIMSS 2015 and each school's targets results (%)
Number of schools in Grade 4 maths	47 (60%)	31 (40%)
Number of schools in Grade 4 science	57 (73%)	21 (27%)
Number of schools in Grade 8 maths	44 (80%)	26 (20%)
Number of schools in Grade 8 science	48(84%)	22 (16%)

The above table 4.4 shows that (60%) of the schools that have improved their TIMSS results in 2015 in comparison to the set targets for the schools in grade 4 for the maths domain and (73%) for the science domain. It also presents that (80%) of the schools have improved in grade 8 for the maths domain and (84%) for the science domain in comparison to the school's targets.

4.2.2 Analysis of PISA results

Table 4.5 shows the number of schools that have positive and negative difference in the results between PISA 2015 and PISA 2012 in maths, science and reading domains for (68) schools.

Table 4.5 The number and percentage of schools that have improved and not improved between the rounds of PISA 2015 and 2012 in maths, science and reading

Category	(+) Positive Difference between PISA 2015 and PISA 2012 results (%)	(-) Negative Difference between PISA 2015 and PISA 2012 results (%)
Number of schools in maths	36 (53%)	32 (47%)
Number of schools in science	46 (68%)	22 (32%)
Number of schools in reading	41 (60%)	27 (40%)

Table 4.5 above showed that for the (68) schools the difference between PISA 2015 and PISA 2012 results for maths was (53%), in science (68%) and in reading (60%) domains.

Table 4.6 shows the difference between the PISA 2015 results and each school's target in PISA for math, science and reading domains.

Table 4.6 The number and percentage of schools that have improved and not improved between PISA 2015 results and each of the school targets for maths, science and reading

Category	(+) Positive Difference between PISA 2015 and each school's targets results (%)	(-) Negative Difference between PISA 2015 and each school's targets results (%)
Number of schools in maths	17 (25%)	51 (75%)
Number of schools in science	10 (15%)	58 (85%)
Number of schools in reading	13 (19%)	53 (81%)

Table 4.6 above show that for the (68) schools the difference between PISA 2015 and PISA 2012 results for maths was (25%), in science (15%) and in reading (19%) domains.

4.2.3 Analysis of PBTS 2017 results

Table 4.7 shows the number of schools that have positive and negative difference in the results between PBTS 2017 and PISA 2015 in maths, science and reading for (65) schools.

Table 4.7 The number and percentage of schools that have improved and not improved between the rounds of PBTS 2017 and PISA 2015 in maths, science and reading

Category	(+) Positive Difference between PBTS 2017 and PISA 2015 results (%)	(-) Negative Difference between PBTS 2017 and PISA 2015 results (%)
Number of schools in maths	17 (26%)	48 (74%)
Number of schools in science	42 (65%)	23 (35%)
Number of schools in reading	38 (58%)	27 (42%)

Table 4.7 above shows that for the (65) schools the difference between PBTS 2017 and PISA 2015 results for maths was (26%), in science (65%) and in reading (58%) domains.

Table 4.8 shows the difference between the PBTS 2017 results and each school's target for PISA 2015 for maths, science and reading domains.

Table 4.8 The number and percentage of schools that have improved and not improved between PBTS 2017 results and each of the school's targets for math, science and reading

Category	(+) Positive Difference between PBTS 2017 and each school's targets results (%)	(-) Negative Difference between PBTS 2017 and each school's targets results (%)
Number of schools in maths	34 (52%)	31 (48%)
Number of schools in science	24 (37%)	41 (63%)
Number of schools in reading	17 (26%)	48 (74%)

Table 4.8 above shows that for the (65) schools the difference between PBTS 2017 and PISA 2015 results for maths was (52%), in science (37%) and in reading (26%) domains.

4.3 Quantitative analysis using *t*-test and ANOVA test for TIMSS, PISA and PBTS results

The purpose for the quantitative analysis for TIMSS 2011 and 2015 results, PISA 2012, 2015 and PBTS 2017 results regarding the selected sample schools is to:

- Examine if there is a significance difference in TIMSS results for maths and science domains in grade 4 and grade 8 in the two rounds 2011 and 2015.
- Examine if there is a significance difference in PISA results between the three domains of maths, science and reading in the two rounds 2012 and 2015, in addition to comparing these results with PBTS 2017 results for the same domains.

The analysis of this and the identification of which of the different test domains, either maths, science or reading, will help the schools to identify where there is weakness in the three subjects, and to focus on the supporting their students in it or even the modification of the curriculum to address the skills and knowledge needed.

This analysis was carried out using SPSS 25 software. The first test to be implemented for both of the TIMSS, PISA and PBTS data set in the two rounds was a *t*-test to check if there are any significant differences for each school in the two rounds. Hence, to examine which of the two

domains math and science in grade 4 or in grade 8 will have the significant difference in the same school. In the second test, ANOVA test for the above data was implemented to check which if any of the three different domains maths, science and reading has the significance difference in the two rounds of PBTS 2017 and PISA 2015 results.

4.3.1 TIMSS grade 4 and grade 8 results *t*-test

The t-test analysis results for the 78 schools that participated in TIMSS 2011 and 2015 at grade 4 for maths and science domains in addition to the 70 schools for TIMSS grade 8 for maths and science domain are shown in tables 4.9 and 4.10. Table 4.9 shows the group's statistics for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains.

Table 4.9 The group statistics for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains

Test		N	Mean	Std. Deviation	Std. Error Mean
Mark	G4 2011 maths	78	465.21	64.47	7.32
	G4 2015 maths	78	512.40	63.48	7.19
	G4 2011 science	78	455.41	72.41	8.20
	G4 2015 science	78	518.27	66.58	7.54
	G8 2011 maths	70	479.34	58.19	6.96
	G8 2015 maths	70	514.76	60.30	7.21
	G8 2011 science	70	483.23	66.05	7.89
	G8 2015 science	70	526.06	61.50	7.35

Table 4.10 shows the t-test analysis for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains.

Table 4.10 The t-test for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains

Mark	Levene's test for equality of Variance		t-test for equality of Means						
	F	sig.	t	df	sig. (2-tail)	Mean Difference	Std. Error Difference	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed (G4 maths 2011 and 2015)	0.125	0.724	**-4.60**	**154**	**0.000**	-47.19	**10.26**	-67.46	-26.92
Equal variances not assumed (G4 maths 2011 and 2015)			-4.60	153.95	0.000	-47.19	10.26	-67.46	-26.92
Equal variances assumed (G4 science 2011 and 2015)	1.177	0.280	**-5.65**	**154**	**0.000**	-62.86	**11.14**	-84.86	-40.86
Equal variances not assumed (G4 science 2011 and 2015)			-5.65	152.93	0.000	-62.86	11.14	-84.86	-40.86
Equal variances assumed (G8 maths 2011 and 2015)	0.067	0.796	-3.54	138	0.001	-35.41	10.02	-55.22	-15.61
Equal variances not assumed			-3.54	137.83	0.001	-35.41	10.02	-55.22	-15.61

(G8 maths 2011 and 2015)									
Equal variances assumed (G8 science 2011 and 2015)	0.586	0.445	-3.97	138	0.000	-42.83	10.79	-64.16	-21.50
Equal variances not assumed (G8 science 2011 and 2015)			-3.97	137.30	0.000	-42.83	10.79	-64.16	-21.50

The results of grade 4 math in TIMSS 2015 (512.4 ± 63.5) are more than grade 4 maths in TIMSS 2011 (465.2 ± 64.7), a statistically significant difference of 10.3 at 99.9% confidence interval, t (154) = -4.60, p= 0.00 ($p < 0.001$). The results of grade 4 science in TIMSS 2015 (518.3 ± 66.6) are more than science grade 4 TIMSS 2011 (455.4 ± 72.4), a statistically significant difference of 11.1 at 99.9% confidence interval, t (154) = -5.65, p= 0.00 ($p < 0.001$). The results of grade 8 maths in TIMSS 2015 (514.8 ± 60.3) are more than grade 8 maths in TIMSS 2011 (479.3 ± 58.2), a statistically significant difference of 10.0 at 99.9% confidence interval, t (138) = -3.5, p= 0.00 ($p < 0.001$). The results of science in grade 8 TIMSS 2015 (526.1 ± 61.5) are more than science grade 8 TIMSS 2011 (483.2 ± 66.0), a statistically significant difference of 10.8 at 99.9% confidence interval, t (138) = -4.0, p= 0.00 ($p < 0.001$).

4.3.2 TIMSS grade 4 and grade 8 results ANOVA test;

The descriptives for the 78 schools that participated in the TIMSS grade 4 and grade 8 for the 2011 and 2015 in maths and science domains was presented in Table 4.11; whereas, the ANOVA test of the TIMSS grade 4 and grade 8 for the 2011 and 2015 in maths and science domains is presented in Table 4.12. The ANOVA test will check if any of the maths or science

skills have significant difference over the other in either grade 4 or grade 8. Table 4.11 represents the descriptives for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains.

Table 4.11 The descriptives for TIMSS grade 4 and grade 8 in 2011 and 2015 for math and science domains

						95% confidence interval for mean			
	Grade and year	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min.	Max.
Mark maths	G4 2011	78	465.21	64.67	7.32	450.62	479.79	323	589
	G4 2015	78	512.40	63.48	7.19	498.08	526.71	348	661
	Total	156	488.80	68.12	5.45	478.03	499.57	323	661
Mark science	G4 2011	78	455.41	72.41	8.20	439.08	471.74	290	592
	G4 2015	78	518.27	66.58	7.54	503.26	533.28	328	660
	Total	156	486.84	76.17	6.10	474.79	498.89	290	660
Mark maths	G8 2011	70	479.34	58.19	6.96	465.47	493.22	336	572
	G8 2015	70	514.76	60.30	7.21	500.38	529.14	370	631
	Total	140	497.05	61.66	5.21	486.75	507.35	336	631
Mark science	G8 2011	70	483.23	66.05	7.89	467.48	498.98	313	588
	G8 2015	70	526.06	61.50	7.35	511.39	540.72	368	656
	Total	140	504.64	67.12	5.67	493.43	515.86	313	656

Table 4.12 represents the ANOVA test for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains.

Table 4.12 The ANOVA test for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains

Mark		Sum of squares	df	Mean Square	F	Sig.
Maths G4	Between groups	88857.44	1	86857.44	**21.15**	**0.000**
	Within groups	632383.40	154	4106.39		

	Total	719240.84	155			
Science G4	Between groups	154098.78	1	154098.78		
	Within groups	745062.22	154	4838.07		
	Total	899160.99	155			
Maths G8	Between groups	43896.01	1	43896.01		
	Within groups	484558.64	138	3511.30	12.50	0.001
	Total	528454.65	139			
Science G8	Between groups	64200.03	1	64200.03		
	Within groups	561978.11	138	4702.31	**15.77**	**0.000**
	Total	626178.14	139			

The results of 156 schools were classified into two groups maths grade 4 (N=78) and science grade 4 (N=78) for the TIMSS 2011 and 2015 rounds. The results obtained were statistically significant different for the maths and science in the same grade, F (2, 154) = 21.15, p= 0.000, ($p < 0.001$) and F (2, 154) = 31.85, p= 0.000, ($p < 0.001$) respectively. The ANOVA analysis for the 70 schools that participated in TIMSS 2011 and 2015 grade 8 was implemented to check if any of the maths or science skills have significant difference over the other. The results of 140 schools were classified into two groups maths grade 8 (N=70) and science grade 8 (N=70) for the TIMSS 2011 and 2015 rounds. The results obtained were statistically significant different for the maths and science subjects in the same grade, F (2, 138) = 12.5, p= 0.001, ($p < 0.001$) and F (2, 138) = 15.77, p=0.000, ($p < 0.001$).

4.3.3 PISA 2012 and 2015 results t-test

The results of the t-test analysis for the 68 schools that participated in PISA 2012 and 2015 for math, science and reading domains results are shown in Tables 4.13 and 4.14 respectively. Table 4.13 shows the group statistics for PISA 2012 and 2015 for maths, science and reading domains.

Table 4.13 The group statistics for PISA 2012 and 2015 for maths, science and reading

Test		N	Mean	Std. deviation	Std. Error Mean
Mark	2012 maths	68	**465.87**	**61.20**	7.42
	2015 maths	68	**470.60**	**51.36**	6.23
	2012 science	68	**471.32**	**63.74**	7.73
	2015 science	68	**478.84**	**57.66**	6.99
	2012 reading	68	**465.46**	**67.65**	8.20
	2015 reading	68	**475.51**	**59.36**	7.20

Table 4.14 shows the t-test analysis for PISA 2012 and 2015 for maths, science and reading domains.

Table 4.14 The t-test for PISA 2012 and 2015 for maths, science and reading domains

Mark	Levene's test for equality of variance		t-test for equality of Means						
	F	sig.	T	df	sig. (2-tail)	Mean Difference	Std. Error Difference	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed (maths 2012 and 2015)	1.163	0.204	**-0.49**	**134**	**0.63**	-4.74	**9.69**	-23.90	14.43
Equal variances not assumed			-0.49	130.10	0..63	-4.74	9.69	-23.90	14.43

(maths 2012 and 2015)									
Equal variances assumed (science 2012 and 2015)	0.553	0.458	**-0.72**	**134**	**0.47**	-7.52	**10.42**	-28.13	13.10
Equal variances not assumed (science 2012 and 2015)			-0.72	132.68	0.47	-7.52	10.42	-28.13	13.10
Equal variances assumed (reading 2012 and 2015)	0.827	0.365	**-0.92**	**134**	**0.358**	-10.06	**10.91**	-31.65	11.53
Equal variances not assumed (reading 2012 and 2015)			-0.92	131.80	0.358	-10.06	10.91	-31.65	11.53

The results of maths in PISA 2015 (470.60 ± 51.36) are more than maths in PISA 2012 (465.87± 61.20), not statistically significant difference of 9.69 at 99.9% confidence interval, t (134) = -0.49, p= 0.63 (p > 0.001). The results of science in PISA 2015 (478.84 ± 57.66) are more than science in PISA 2012 (471.32 ± 63.74), which is not a statistically significant difference at 10.42 at 99.9% confidence interval, t (134) = -0.72, p= 0.49 (p > 0.001). The results of reading in PISA 2015 (475.51 ± 59.36) are more than reading in PISA 2012 (465.46 ± 67.65), which is not a statistically significant difference at 10.91 at 99.9% confidence interval, t (134) = -0.92,

p= 0.36 (p > 0.001), which is not a statistically significant difference at 10.91 at 99.9% confidence interval.

4.3.4 PISA 2012 and 2015 results ANOVA test

The descriptives for the 68 schools that participated in the PISA 2015 and PISA 2012 for math, science and reading domains are presented in Table 4.15; whereas, the ANOVA test of the PISA 2015 and PISA 2012 for maths, science and reading domains are presented in Table 4.16. ANOVA test will check if any of the maths, science and reading domains have significant difference over the other. Table 4.15 represents the descriptives for PISA 2015 and 2012 for maths, science and reading domains.

Table 4.15 The descriptives for PISA 2015 and 2012 for maths, science and reading domains

Mark						95% confidence interval for mean			
	Grade and year	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min.	Max.
Mark maths	2012	68	465.87	61.20	7.42	451.05	480.68	297	577
	2015	68	470.60	51.36	6.23	458.17	483.03	340	555
	Total	136	468.24	56.34	4.83	458.68	477.79	297	577
Mark science	2012	68	471.84	63.74	7.73	455.90	486.75	298	591
	2015	68	478.84	57.66	6.99	464.88	492.80	344	592
	Total	136	475.08	60.67	5.20	464.79	485.37	298	592
Mark Reading	2012	68	465.46	67.65	8.20	449.08	481.83	243	583
	2015	68	475.51	59.36	7.20	461.15	409.88	340	572
	Total	136	470.49	63.61	5.45	459.70	481.27	243	583

Table 4.16 represents the ANOVA test for PISA 2015 and 2012 for maths, science and reading domains.

Table 4.16 The ANOVA test for PISA 2015 and 2012 for maths, science and reading domains

Mark		Sum of squares	Df	Mean Square	F	Sig.
Maths	Between groups	762.38	1	762.38	**0.24**	**0.63**
	Within groups	427708.09	**134**	3191.85		
	Total	428470.47	135			
Science	Between groups	1920.01	1	1920.01	**0.52**	**0.47**
	Within groups	494934.10	**134**	3693.54		
	Total	496854.11	135			
Reading	Between groups	3440.12	1	3440.12	**0.85**	**0.36**
	Within groups	5427709.85	**134**	4050.07		
	Total	546149.97	135			

The results of 136 schools were classified into three groups maths (n=68), science (n=68) and reading (n=68) for the PISA 2012 and 2015 rounds. The results obtained were not a statistically significant different for any of the two subjects (maths, science), (maths, reading) and (science, reading), F (2, 134) = 0.24, p= 0.63 (p > 0.001), F (2, 134) = 0.52, p=0.47 (p > 0.001) and F (2, 134) = 0.85, p=0.36 (p > 0.001). This means that for PISA 2015 and 2012 results for maths, science and reading domains there are no significance difference between the two rounds of PISA results for the three domains.

4.3.5 PISA 2015 and PBTS 2017 results *t*-test

The results of the t-test analysis for the 65 schools that participated in PISA 2015 and PBTS 2017 for math, science and reading domains are shown in Tables 4.17 and 4.18 respectively. Table 4.17 shows the group statistics for PISA 2015 and PBTS 2017 for maths, science and reading domains.

Table 4.17 The group statistics for PISA 2015 and PBTS 2017 for maths, science and reading

Test		N	Mean	Std. deviation	Std. Error Mean
Mark	PISA 2015 maths	65	**473.06**	**48.79**	6.05
	PBTS 2017 maths	65	**491.48**	**67.90**	8.42
	PISA 2015 science	65	**481.77**	**55.07**	6.83
	PBTS 2017 science	65	**488.68**	**53.24**	6.60
	PISA 2015 reading	65	**478.88**	**57.01**	7.07
	PBTS 2017 reading	65	**481.58**	**57.63**	7.15

Table 4.18 shows the t-test analysis for PISA 2015 and PBTS 2017 for maths, science and reading domains.

Table 4.18 The t-test for PISA 2015 and PBTS 2017 for maths, science and reading domains

Mark	Levene's test for equality of variance		t-test for equality of Means						
	F	sig.	t	df	sig. (2-tail)	Mean Difference	Std. Error Difference	95% confidence interval of the difference	
								Lower	Upper
Equal variances assumed (maths PISA 2015 and PBTS 2017)	9.215	0.003	**-1.78**	**128**	**0.08**	-18.42	**10.37**	-38.93	2.10
Equal variances not assumed (maths PISA 2015 and PBTS 2017)			-1.78	116.18	0.08	-18.42	10.37	-38.95	2.10

Equal variances assumed (science PISA 2015 and PBTS 2017)	0.001	0.976	**-0.73**	**128**	**0.47**	-6.91	**9.50**	-25.71	11.89
Equal variances not assumed (science PISA 2015 and PBTS 2017)			-0.73	127.86	0.47	-6.91	9.50	-25.71	11.89
Equal variances assumed (reading PISA 2015 and PBTS 2017)	0.087	0.768	**-0.27**	**128**	**0.79**	-2.71	**10.06**	-22.60	17.19
Equal variances not assumed (reading PISA 2015 and PBTS 2017)			-0.27	127.99	0.79	-2.71	10.06	-22.60	17.19

The results of maths in PBTS 2017 (491.48 ± 67.90) are more than maths in PISA 2015 (473.06 48.79); it is not a statistically significant difference at 10.37 at 99.9% confidence interval, t (128) = -1.78, p= 0.08, (p >0.001). The results of science in PBTS 2017 (488.68 ± 53.24) are more than science PISA 2015 (481.77 ± 55.07), which is not a statistically significant difference at 9.50 at 99.9% confidence interval, t (128) = -0.73, p= 0.47 (p < 0.001). The results of reading in PBTS 2017 (481.58 ± 57.63) are more than reading PISA 2015 (478.88 ± 57.01), which is not a statistically significant difference at 10.06 at 99.9% confidence interval, t (128) = -0.27, p= 0.79 (p > 0.001).

4.3.6 PISA 2015 and PBTS 2017 results ANOVA test

The descriptives for the 65 schools that participated in the PISA 2015 and PBTS 2017 for maths, science and reading domains is presented in Table 4.19; whereas, the ANOVA test of the PISA 2015 and PBTS 2017 for maths, science and reading domains is presented in Table 4.20. ANOVA test will check if any of the maths, science and reading domains have a significant difference over the other. Table 4.19 represents the descriptives for PISA 2015 and PBTS 2017 for maths, science and reading domains.

Table 4.19 The descriptives for PISA 2015 and PBTS 2017 for maths, science and reading domains

Mark						95% confidence interval for mean			
	Grade and year	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Min.	Max.
Mark maths	PISA2012	65	473.06	48.79	6.05	460.97	485.15	370	555
	PBTS 2017	65	491.48	67.90	8.42	474.65	508.30	342	604
	Total	130	482.27	59.61	5.23	471.93	492.61	342	604
Mark science	PISA2012	65	481.77	55.07	6.83	468.12	495.41	358	592
	PBTS 2017	65	488.68	53.24	6.60	475.48	501.87	367	583
	Total	130	485.22	54.06	4.74	475.84	494.60	358	592
Mark reading	PISA2012	65	478.88	57.01	7.07	464.75	493.00	352	572
	PBTS 2017	65	481.58	57.63	7.15	467.30	395.87	361	572
	Total	130	480.23	57.11	5.01	470.32	490.14	352	572

The ANOVA analysis for the 65 schools that participated in PISA 2015 and PBTS 2017 was implemented to check if any of the maths, science and reading domains have significant difference over the other. Table 4.20 represents the ANOVA test for PISA 2015 and PBTS 2017 for maths, science and reading domains.

Table 4.20 The ANOVA test for PISA 2015 and PBTS 2017 for maths, science and reading domains

Mark		Sum of squares	Df	Mean Square	F	Sig.
Maths (PISA 2015 and PBTS 2017)	Between groups	11021.61	1	11021.61	**3.15**	**0.08**
	Within groups	447365.97	**128**	3495.05		
	Total	458387.58	129			
Science (PISA 2015 and PBTS 2017)	Between groups	1550.78	1	1550.78	0.53	0.47
	Within groups	375493.75	128	2933.55		
	Total	377044.53	129			
Reading (PISA 2015 and PBTS 2017)	Between groups	238.28	1	238.28	0.07	0.79
	Within groups	420552.80	128	3285.57		
	Total	420791.01	129			

The results from 130 schools were classified into three domains math, science and reading for the PISA 2015 and PBTS 2017 rounds. The results obtained were not a statistically significant different for any of the two domains (maths, science), (maths, reading) and (science, reading), F (2, 128) = 3.15, p=0.08 (p > 0.001). F (2, 128) = 0.53, p= 0.5 (p > 0.001) and F (2, 128) = 0.07, p=0.79 (p > 0.001), meaning that none of the two groups show a significant difference.

4.4 Quantitative statistical analysis of principals' surveys

Another set of data that was collected for this research is the Dubai private school principals' perceptions, through a survey that was sent to them. The survey questions were developed and sent via an online link by email to the principals. The email was sent to 100 school principals, but only 95 were successful emails; the other, five were not correct emails addresses. Only 24 principals responded and completed the survey, which means it is only (25%).

This is a normal level of response from schools in Dubai and UAE where it is usually difficult for schools to participate in any educational research apart from those coming from an official governmental organisation.

The survey questions were developed by the researcher to cover the following sections of this research:

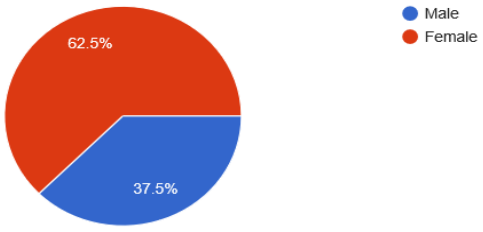
1- Demographic information related to each principal.
2- Principals' perceptions regarding the implementation of the National Agenda Policy in their schools.
3- The progress made by the private schools in Dubai towards achieving the National Agenda targets.
4- The challenges for private schools in Dubai in implementing the National Agenda Policy.

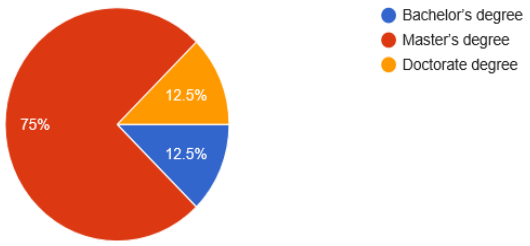
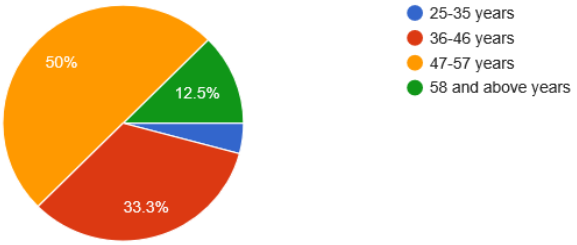
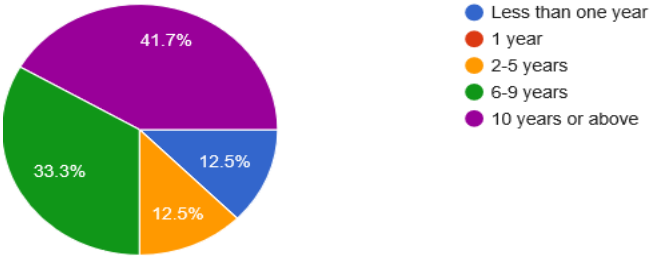
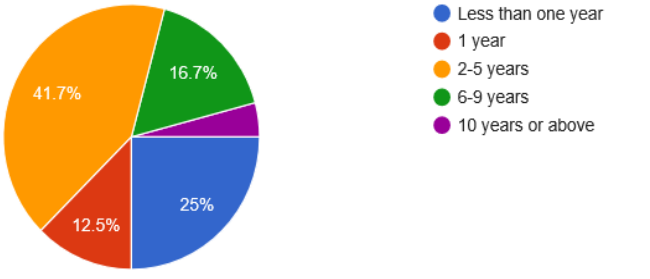
The researcher will consider the analysis of the above sections individually:

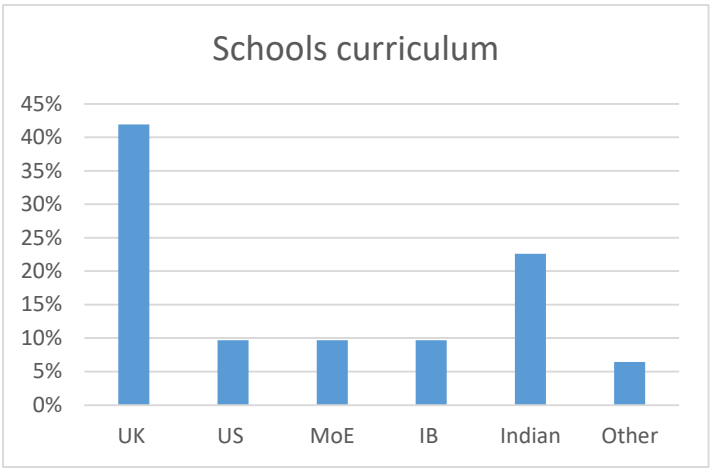
4.4.1 Demographic information

The analysis of questions 1-6 are related to the demographic information of each principal. The analysis of these questions is represented in Table 4.21.

Table 4.21 The analysis of demographic information of the participating principals.

Questions	Percentage
1- Gender	

2-Highest Educational Degree	
3-Age	
4-Number of years as a principal	
5-Number of years as a principal in the school	

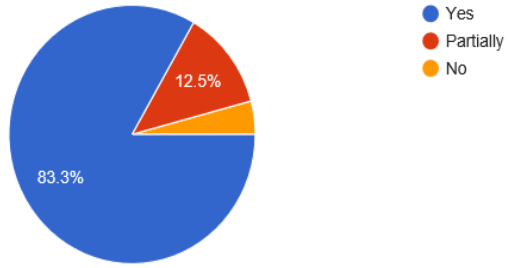
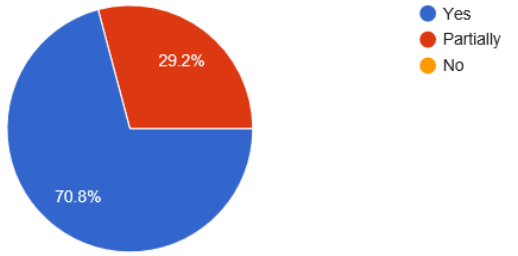
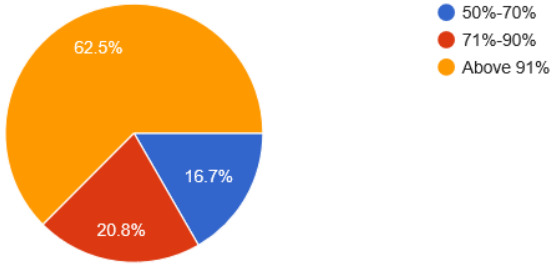
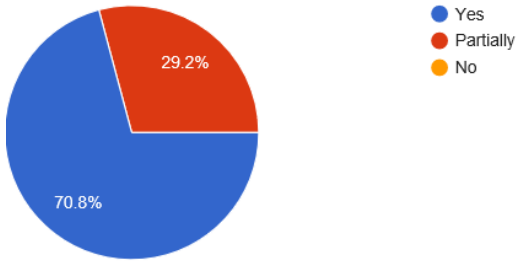
6-Which curriculum does your school use?	

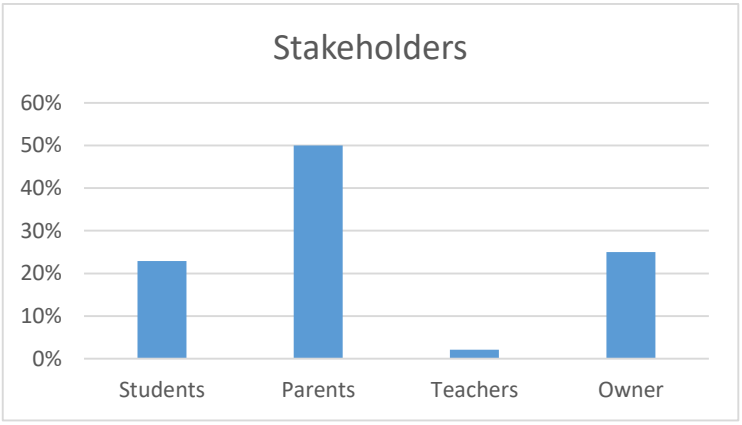
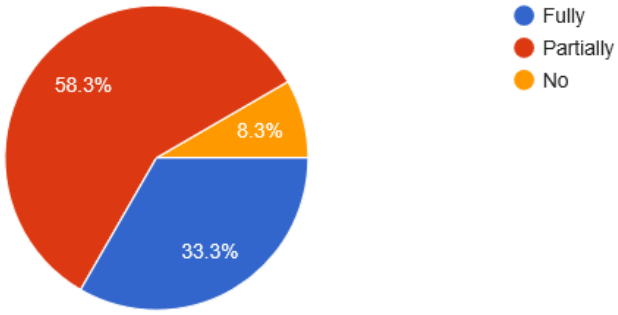
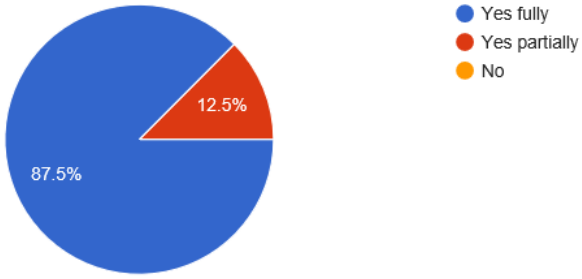
The analysis of the table and charts above shows the following about the principals' demographic information: 87.5% of the participants have at least a Master degree, and 50% are more than 47 years old. The schools of the participating principals represent a wide range of curricula. Regarding experience, 75% of them have more than 6 years' experience as a principal and 58.4% of them have experience of at least 6 years as a principal in their current school. This means they were in their school when the National Agenda Policy was announced in 2014 and hence have worked over the years in close cooperation with DSIB to improve the school's outcomes and to meet the school's National Agenda targets, and hence achieve the National Agenda policy.

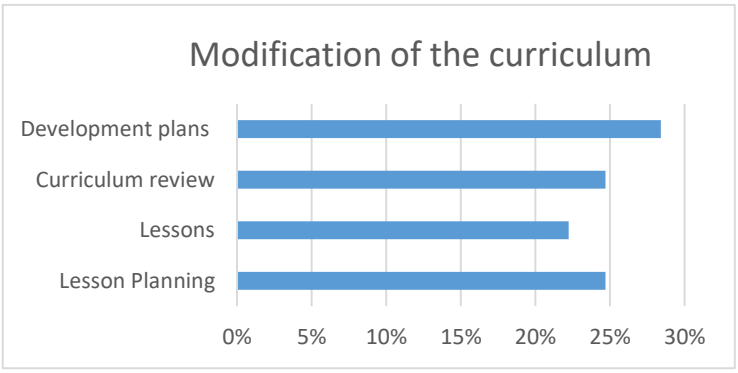
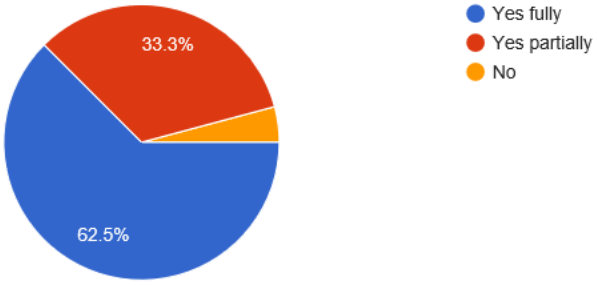
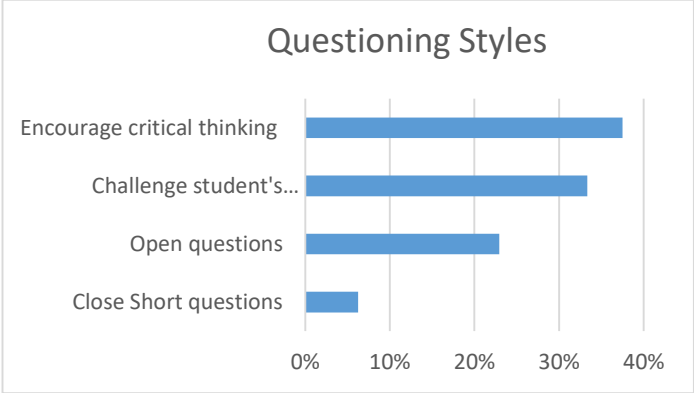
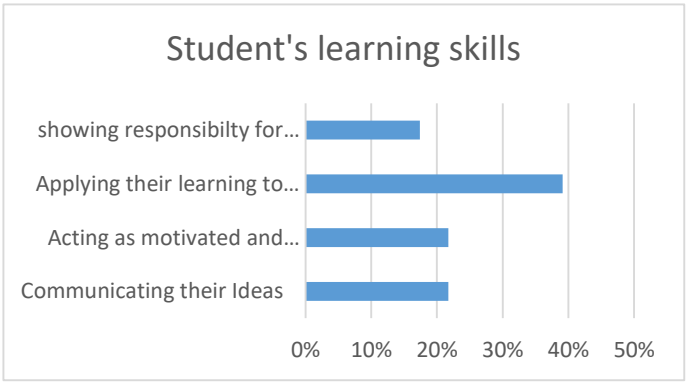
4.4.2 Survey questions related to what are the Principals' perceptions on the implementation of the National Agenda Policy in their schools

The analysis of the following questions 8, 9, 10, 14, 15, 16, 19, 20, 22, 23, 24 is related to answering the questions of the Principals' perceptions on the implementation of the National Agenda Policy in their schools. The analysis of these questions is represented in table 4.22.

Table 4.22 The analysis of survey questions related to what are the principals' perceptions on the implementation of the National Agenda Policy in their schools

Questions	Percentage
8- Has the school participated in all benchmark tests?	
9- Were the curriculum benchmark tests used aligned to your curriculum?	
10- What was the percentage of students who have participated in the school benchmark tests in the last academic year 2017-2018?	
14- Do you think that the school effectively promotes the awareness and understanding of the National Agenda targets among students, parents, teachers and owners?	

15- Which of the different school stakeholders do you think are not effectively aware of the school's National Agenda target?	
16- Has the school effectively modified its curriculum to be aligned to PISA, TIMSS and PBTS framework?	
19- Are the National Agenda targets included in the school development plans?	

20- Where can you observe the modification of the curriculum to meet the National Agenda framework?	
22- Are the National Agenda targets included in the departmental development plans?	
23- What questioning styles are your teachers implementing with your students in lessons of the different subjects?	
24- What learning skills do your students demonstrate when they are in lessons?	

From the surveys, 83.3% of the principal's mentioned that their school participates in all benchmark tests, with 71% of the them mentioned that they are using the correct benchmark tests for their students; 83.3% of them mentioned that more than 71% of their students participated in these benchmark tests.

Regarding effectively promoting awareness and understanding of the National Agenda targets among students, parents, teachers and owners. 71% of the principal said that their school did, with 50% of this awareness concentrated on the parents.

Regarding curriculum modifying, 58.3% of the schools effectively modified their curriculum to be aligned to the PISA, TIMSS and PBTS framework and 87.5% of the principals mentioned that the National Agenda targets were included in the school development plans.

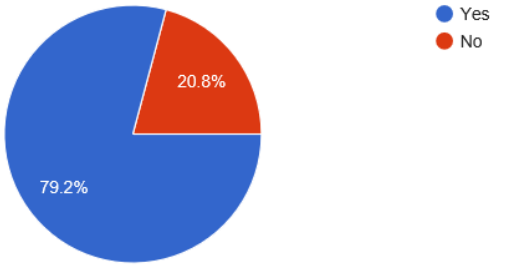
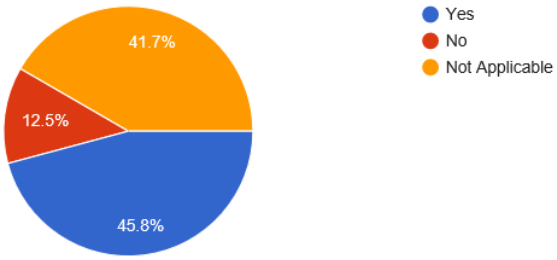
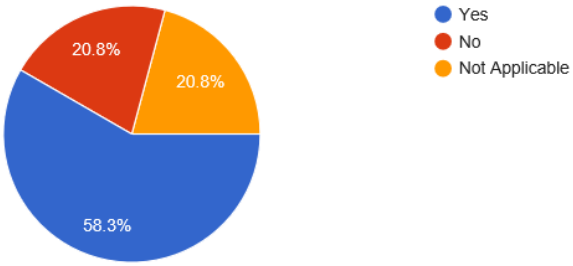
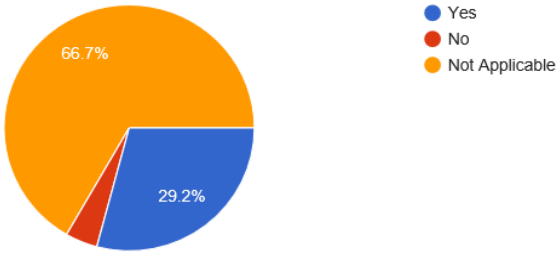
In an a equal percentage, the four different areas; of lesson planning, lessons, curriculum review and development plan were modified in the curriculum in order to meet the National Agenda framework. Of the questioning styles that the teachers were implementing with students in lessons of the different subjects, 39% were to encourage critical thinking, then 35% to challenge students' differing abilities. Hence, almost 40% of the students are applying their learning to real life situations, according to the principals.

The analysis of the above different survey questions related to the principals' perceptions of the implementation of the National Agenda Policy in their schools, and gave an example of the schools applying the National Agenda targets to their curriculum and to modifying their teaching strategies and students' learning skills by modification of the curriculum to meet the PISA, TIMSS and PBTS framework and using the different required benchmark tests.

4.4.3 Survey questions to answer whether private schools in Dubai made progress towards achieving the National Agenda target

The analysis of the following questions 7, 11, 12, 13 related to answering whether private schools in Dubai made progress towards achieving the National Agenda targets is represented in table 4.23.

Table 4.23 The analysis of questions to answer whether private schools in Dubai made progress towards achieving the National Agenda targets

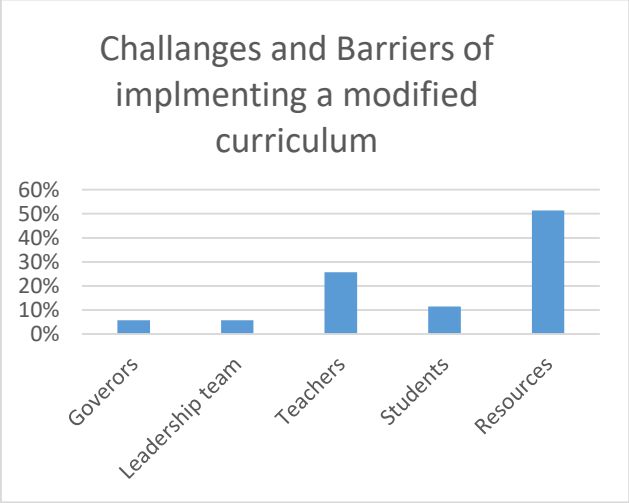
Questions	Percentage
7- Has the school achieved its National Agenda targets for the last academic year 2017-2018?	
11- Did the School meet its National Agenda target in PISA 2015 test (if applicable)?	
12- Did the School meet its National Agenda target in TIMSS 2015 test (if applicable)?	
13- Did the School meet its National Agenda target in PISA Based Test for Schools test in 2017 (if applicable)?	

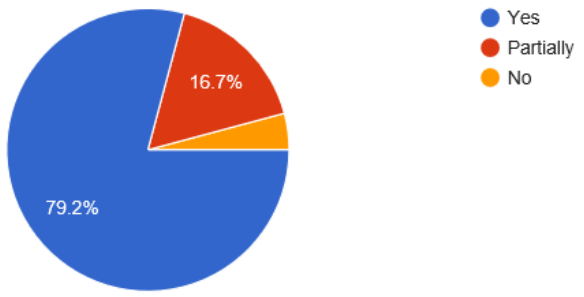
Of the principals, 79.2% mentioned that their school had achieved its National Agenda targets for the year 2017-2018; 45.8% mentioned they have achieved the National Agenda targets in PISA, while 58.3% have achieved their targets in TIMSS and 29.2% have achieved their target in PBTS. All of this analysis supports the answer to whether private schools in Dubai made progress towards achieving the National Agenda targets.

4.4.4 What are the challenges for private schools in Dubai in implementing the National Agenda Policy.

The analysis of the questions 17 and 26 are related to answering, what are the challenges for private schools in Dubai in implementing the National Agenda Policy? The analysis of these questions is represented in table 4.24.

Table 4.24 The analysis of questions to answer what are the challenges for private schools in Dubai in implementing the National Agenda Policy.

Question	Percentage
17- What would be the challenges and barriers of implementing a modified curriculum for the school to meet the National Agenda targets?	

26- Is your school likely to achieve its National Agenda targets by 2021?	

Half (50%) of the principals mentioned that resources are the main challenge and barrier of implementing the modification of the curriculum in the school to meet the National Agenda target, and around 25% of these challenges are from the availability of good teachers in the school. 79.2% of the principals are likely to achieve their National Agenda target in the year 2021. This will help in answering research question 6 about the challenges and barriers of modifying the school curriculum to meet the National Agenda targets.

4.5 Qualitative analysis of school inspection reports

The National Agenda Parameter section in the KHDA/DSIB inspection reports in each of the academic years 2015-2016, 2016-2017 and 2017-2018 was analysed for each of the different sample schools. The focus of the analysis of these reports was mainly to compare the progress of these schools in the categories of the National Agenda framework for the National Agenda Parameter and what the schools have been doing to improve their progress towards the following actions:

1- What actions the school have taken to improve and modify their curriculum.

2- What practices teachers especially in math, science and reading, are using in their classrooms to include critical thinking, research and investigation skills.

3- What the students are learning, and how students are developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data.
4- What additional resources the schools have purchased to support the changes in teaching strategies.

The researcher chose this instrument to collect the information regarding these schools' development plans and modifications, because inspection reports are published from an independent governmental organisation in Dubai that monitors the schools' performance and which gives a report for each school about their overall performance, and especially, the schools' progress towards achieving the National Agenda Parameter. Another issue, the triangulations of results, which will lead to the influence of the different schools' curriculum on the successful implementation of the National Agenda policy and hence to differences among students' performances in the different tests PISA, TIMSS and PBTS.

4.5.1 Using NVivo software in analysing qualitative data

In this section an example is given of how the NVivo software was used to analyse the school inspection reports. The text related to the National Agenda targets for the schools that participated in TIMSS, PISA and PBTS tests for the three academic years 2015-2016, 2016-2017 and 2017-2018. (-Tables and figures in this section (4.5.1) are not related to one set of data-. Table 4.25 represents the National Agenda text for one of the schools as it appears in the school inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018.
Based on the researcher's experience of how this analysis of the qualitative data should be, the following methodology for the analysis of the qualitative data was used which the researcher developed for easy interpretations of the analysis, and to link this to the research objective and to help in answering the research questions.

Table 4.25 The National Agenda text published in a school inspection report for one school example for the three academic years 2015-2016, 2016-2017 and 2017-2018

2015-2016	2016-2017	2017-2018
-The school met the registration requirements of the National Agenda Parameter. Progress towards meeting the National Agenda targets was not fully secure. -The school promoted awareness and understanding of the National Agenda targets among its staff through regular discussion at staff meetings, lesson planning discussions and training sessions. Parents, students and governors had a clear understanding of the National Agenda and understood the scope and purpose of participating in international testing. -The school had aligned the English, mathematics and science curricula to the TIMSS and PISA test requirements. Additional content had been included in subject schemes of work. For example, Earth science had been added in Year 5. Teachers' lesson plans included the promotion of critical thinking, independent learning and opportunities for students to develop their research skills. In addition, leaders had ensured professional development sessions for all staff to focus on further developing their use of questioning. -The majority of lessons in English, mathematics and science promoted the development of students' critical thinking as outlined in the National	- School meets the registration requirements for the National Agenda Parameter. - Attainment based on the National Agenda Parameter benchmark tests is above expectations in mathematics and science. In English, attainment is secure but not consistent across all grades. - The school has effectively analysed the National Agenda Parameter benchmark reports for 2015/16 and has developed a detailed action plan to improve the standards of education. Leaders have identified gaps in the curriculum relative to the National Agenda. Comprehensive training is provided to assist school leaders and staff in analyzing and interpreting the National Agenda Parameter results. - The school has strengthened its curriculum in English, mathematics and science by adopting a common set of international benchmark standards from the top performing PISA and TIMSS nations. This enables the students to be equipped with the knowledge and skills to be globally competitive. - Teachers use questioning to prompt students into forming their own lines of enquiry and investigation in order to develop critical thinking skills. Students in the primary and secondary phases engage in a range of open ended investigations but not consistently across the school. In the secondary phase, older students form hypotheses and evaluate their findings in order to reach informed conclusions. - The school has demonstrated commitment to developing students' research skills as a sound basis for life-long learning. In most year groups, students are now developing more independence in their learning and can form their own lines of enquiry.	-Attainment in the National Agenda Parameter (N.A.P) in English, mathematics and science is above expectations. - The school meets the registration requirements for the N.A.P. - The school's National Agenda information impacts on clear strategic developments, in the action plan targeted at raising the quality of teaching and students' attainment. - The analysis of all the data is thorough and identifies strengths and weaknesses. This information is used by teachers to personalize their planning. - The thorough analysis, undertaken by the school, has enabled adaptation of the curriculum to meet the demands of TIMSS and PISA. - The focus on critical thinking and problem solving is an improving feature of lessons and it is impacting on students' learning. It is a strong feature in mathematics. - Lessons are focused on the engagement of students through critical thinking. Their research skills are enhanced through the use of technology and innovative project work. - Overall, the school's provision for achieving National Agenda targets meets expectations.

Agenda. Teachers allowed students time for thinking and encouraged discussion. Problem solving, discussion and investigation were fundamental to students' learning. This was particularly the case in upper secondary. Most students gathered a wide range of information from different sources, demonstrating creative skills in sharing and presenting their learning. - A range of learning technologies and other resources were available for students to develop their research skills.	Older students are able to access information and extract the required insights to form critical evaluations. - Overall the school's improvement towards achieving its National Agenda targets is above expectations.	

The NVivo analysis of the above text, for example, led to the following table of Autocoded themes, which was used to create the finding themes of the inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018. Table 4.26 represents the Autocoded themes found when the schools inspection reports in the three academic years were analysed using NVivo software.

Table 4.26 Autocoded themes found the (78) schools inspection reports through NVivo analysis

Autocoded Themes for 2015-2016

	Name	References
2	attainment	42
5	data	45
10	development	29
23	learning	46
40	lessons	35
57	planning	29
73	questioning	34
88	registration requirements	74
90	requirements	95
102	research	60
125	research skills	37
132	school	36
162	skills	138
209	students	73
239	subject	29
252	targets	28
268	teachers	49
287	technology	40
299	tests	50
317	thinking	99
328	use	28
349	students	37

Autocoded Themes for 2016-2017

	Name	References
2	ability	22
13	action plan	29
25	analysis	22
39	assessment	53
66	benchmark	46
82	benchmark tests	29
87	curriculum	33
112	data	59
148	developing	24
160	leaders	26
167	learning	48
197	lesson	29
210	plan	52
231	questioning	26
249	registration requirements	76
251	requirements	88
261	research	60
286	research skills	34
290	school	28
313	skills	110
354	strategies	24
362	students	75
394	subject	30
411	teaching	55
430	tests	61
452	thinking	73
462	use	23
479	students	30

Autocoded Themes for 2017-2018

	Name	References
2	action plan	41
12	analyses	22
22	analysis	30
32	assessment	42
53	benchmark	45
66	cognitive	21
75	curriculum	36
95	data	76
127	data analysis	24
132	effective	20
147	improvement	20
160	individual	23
171	information	19
183	leaders	27
189	leadership	23
196	learning	56
216	plan	71
237	registration requirements	76
239	requirements	86
245	research	29
255	research skills	22
259	school	31
273	skills	67
292	strategies	37
304	students	52
325	targets	18
339	teaching	54
353	teaching strategies	24
356	technologies	19
363	tests	66
387	thinking	58
397	use	18
411	students	22
413	teachers	20

The above Autocoded words that were found across the National Agenda text in the inspection reports over the three academic years were collected into themes and converted to a percentage of their appearance in these reports as shown in Figure 4.1.

Figure 4.1 represents the collection of the found theme words in the different five finding themes that will be used to answer the research questions. This is indicated through the different colours used to identify and link the thematic words with each other to be correlated to the research finding themes, which are as following:

1- Assessment tests and use of Data

2- National Agenda Requirements

3- Lesson and curriculum planning

4- Teaching and teaching strategies

5- Students' learning skills

Figure 4.1 Collection of the thematic words in the research corresponding to the different five themes from inspection reports across the three years 2015-2016, 2016-2017 and 2017-2018

Theme words 2015-2016	referances	%
attainment Data	42	4%
ability		
action		
analysis		
assessment		
benchmark		
benchmark tests		
curriculum		
data	45	4%
development	29	3%
early stages		
effective		
individual		
information		
internal assessment		
leaders		
learning	46	4%
lessons	35	3%
planning	29	3%
questioning	34	3%
registration requirements	74	7%
requirements	95	8%
research	60	5%
research skills	37	3%
improvement		
results		
school	36	3%
skills	138	12%
strategies		
students	73	6%
subject	29	3%
targets	28	2%
teachers	49	4%
technology	40	4%
tests	50	4%
use	28	
thinking	99	9%
students	37	3%
Total	1133	98%

Theme words 2016-2017	referances	%
attainment Data		
ability	19	2%
action	23	2%
analysis	21	2%
assessment	45	4%
benchmark	40	4%
benchmark tests	28	3%
curriculum	26	2%
data	50	5%
development	19	2%
early stages		
effective		
individual		
information		
internal assessment		
leaders	20	2%
learning	42	4%
lessons	23	2%
planning	42	4%
questioning	27	2%
registration requirements	63	6%
requirements	73	7%
research	53	5%
research skills	28	3%
improvement		
results		
school	22	2%
skills	91	8%
strategies	20	2%
students	56	5%
subject	27	2%
targets	19	2%
teachers	44	4%
technology		
tests	57	5%
use	19	2%
thinking	61	6%
students	23	2%
Total	1081	100%

Theme words 2017-2018	referances	%
attainment Data		
ability	41	4%
action	33	3%
analysis	25	2%
assessment	42	4%
benchmark	38	3%
benchmark tests		
curriculum	29	3%
data	59	5%
development	15	1%
early stages	15	1%
effective	16	1%
individual	19	2%
information	19	2%
internal assessment	15	1%
leaders	37	3%
learning	46	4%
lessons	15	1%
planning	62	6%
questioning		
registration requirements	64	6%
requirements	72	6%
research	25	2%
research skills	33	3%
improvement	16	1%
results	16	1%
school	20	2%
skills	52	5%
strategies	28	2%
students	40	4%
subject		
targets		
teachers	87	8%
technology		
tests	61	5%
use	20	2%
thinking	48	4%
students	17	2%
Total	1125	100%

Then the above percentages were collected and presented into the research five themes, which are shown in Figure 4.2. Figure 4.2 represents the Autocoded words collected into the five main finding theme in the inspection reports and the number of references and the percentage of each repeated themes in all inspection reports for that academic year.

Figure 4.2 Autocoded themes found in the schools' inspection reports through NVivo analysis; this is a collection of the above (Figure 4.1)

Themes 2015-2016	referances	percentage	Theme 2016-2017	referances	percentage	Theme 2017-2018	referances	percentage
use of Data and assessment tests	137	12%	use of Data and assessment tests	321	25%	use of Data and assessment tests	411	30%
Natinal agenda requirments	169	15%	Natinal agenda requirments	164	13%	Natinal agenda requirments	162	12%
planning curriculum and lesson planning	64	6%	planning curriculum and lesson planning	114	9%	planning curriculum and lesson planning	165	12%
teachers and teaching stratigies	176	16%	teachers and teaching stratigies	231	18%	teachers and teaching stratigies	266	20%
students learning skills	587	52%	students learning skills	454	35%	students learning skills	360	26%
Total	**1133**	**100%**	**Total**	**1284**	**100%**	**Total**	**1364**	**100%**

The different percentages of the five themes in each year are shown, with the difference in these percentages among the different inspection reports in the different years as presented in Table 4.27.

Table 4.27 Themes' occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4, g1 and g2

Themes	2015-2016 G4, g1	2016-2017 G4, g1	2017-2018 G4, g1	2015-2016 G4, g2	2016-2017 G4, g2	2017-2018 G4, g2
TH1 (Assessment tests and use of Data)	7%	27%	37%	12%	28%	30%
TH2 (National Agenda Requirements)	19%	14%	8%	14%	13%	14%
TH3 (Lesson and curriculum planning)	9%	11%	2%	6%	11%	12%
TH4 (Teaching and teaching strategies)	21%	12%	32%	18%	12%	19%
TH5 (Students' learning skills)	44%	36%	21%	50%	36%	25%

Then the percentages of the finding themes in Table 4.27 are compared with the research main themes, using Table 4.28 to correlate the answers between them.

Table 4.28 Research themes correlated to finding themes in the inspection reports

Research themes	Findings themes in the inspection reports
1-What actions the school have taken to improve and modify their curriculum? (RT1)	2-National Agenda requirements (TH2) 3-Lesson and curriculum planning (TH3)
2-What practices teachers especially in math, science and reading are using in their classrooms to include critical thinking, research and investigation skills? (RT2)	1-Assessment tests and use of Data (TH1) 4-Teaching and teaching strategies (TH4)
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	5-Students' learning skills (TH5)

An example of TIMSS 2015 and 2011 grade 4 for group1 and group 2 will show the correlation between the finding themes of school inspection reports over three academic years, 2015-2016, 2016-2017 and 2017-2018, and the research themes, which is presented in Table 4.29.

Table 4.29 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 g1 and g2

Research Themes	%Findings themes G4 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G4 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	28	25	10	20	24	26
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to	28	39	69	30	40	49

include critical thinking, research and investigation skills? (RT2)						
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	44	36	21	50	36	25

The chart 4.1 represents the increase or decrease of any of the research themes, for example TIMSS 2015 and 2011 grade 4 group 1 and group 2.

Chart 4.1 Research themes for schools reports of G4 TIMSS 2015 and 2011 g1 and g2

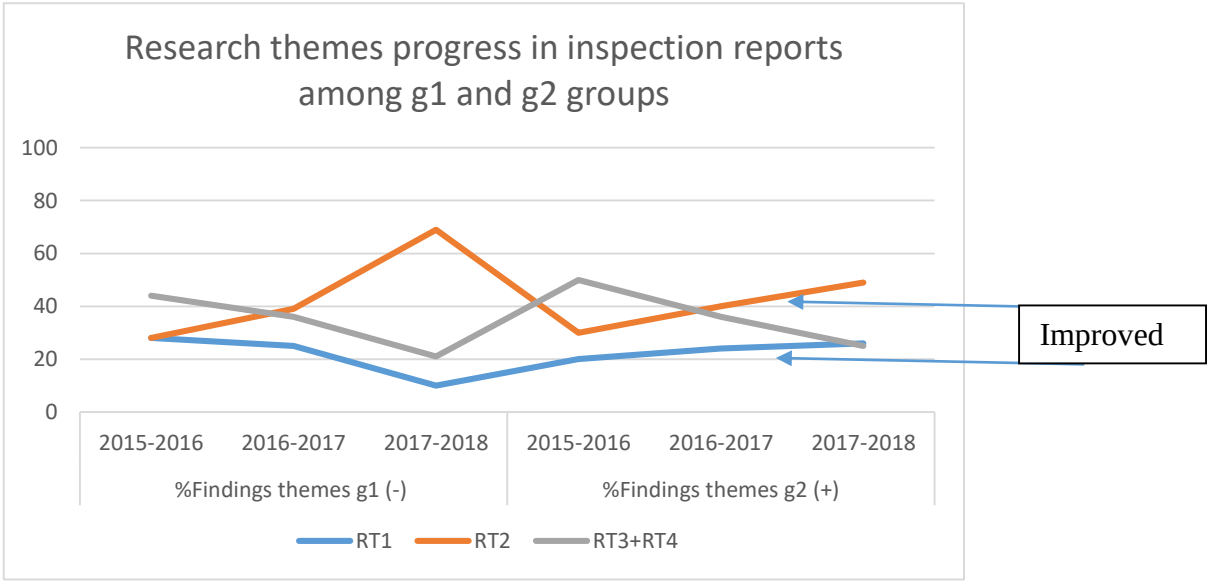


Chart 4.1 represents the progress of the research themes found in inspection reports for, as an example, grade 4 TIMSS 2015 and TIMSS 2011. It shows that schools that have improved in their TIMSS results between 2011 and 2015, as the two blue arrows shows have they improved their modification of their curriculum (RT1) and that teachers have improved their practices

(RT2) and have included critical thinking, research and investigation skills; while, learning skills and improvement of resources have shown a drop from one year to another.

The above analysis will be repeated for each skill domain and the improvement in each of the research themes will be highlighted.

4.5.2 Analysis of the inspection reports for schools participated in TIMSS 2011 and 2015 results

4.5.2.1 Grade 4 results

In this group of schools there are (78) schools inspection reports for the schools that participated in TIMSS grade 4 in the years 2011 and 2015, for the three academic years 2015-2016, 2016-2017 and 2017-2018 that was published on the KHDA website.

There were two groups in each of the analysis:

1- Group 1, which consists of the schools reports for schools that have dropped in their results from TIMSS 2015 to 2011 grade 4.

2- Group 2, which consists of the schools reports for schools that have improved in their results from TIMSS 2015 to 2011 grade 4.

Table 4.30 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4 for group 1 and group 2.

Table 4.30 Themes' occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4, g1 and g2

Themes	2015-2016 G4, g1	2016-2017 G4, g1	2017-2018 G4, g1	2015-2016 G4, g2	2016-2017 G4, g2	2017-2018 G4, g2
TH1 (Assessment tests and use of Data)	7%	27%	37%	12%	28%	30%
TH2 (National Agenda Requirements)	19%	14%	8%	14%	13%	14%
TH3 (Lesson and curriculum planning)	9%	11%	2%	6%	11%	12%
TH4 (Teaching and teaching strategies)	21%	12%	32%	18%	12%	19%
TH5 (Students' learning skills)	44%	36%	21%	50%	36%	25%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 4 to the research themes. In Table 4.31 the research themes are presented.

Table 4.31 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 for g1 and g2

Research Themes	%Findings themes G4 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G4 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions the school have taken to improve and modify their curriculum? (RT1)	28	25	10	20	24	26
2-what practices teachers especially in math, science and reading are using in their classrooms to include critical thinking, research and investigation skills? (RT2)	28	39	69	30	40	49
3-what is the students learning, and how students are developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3)	44	36	21	50	36	25

4-What additional resources the schools have purchase to support the changes in teaching strategies? (RT4)						

Chart 4.2 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 4 group 1 and group 2.

Chart 4.2 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 group1 and group 2

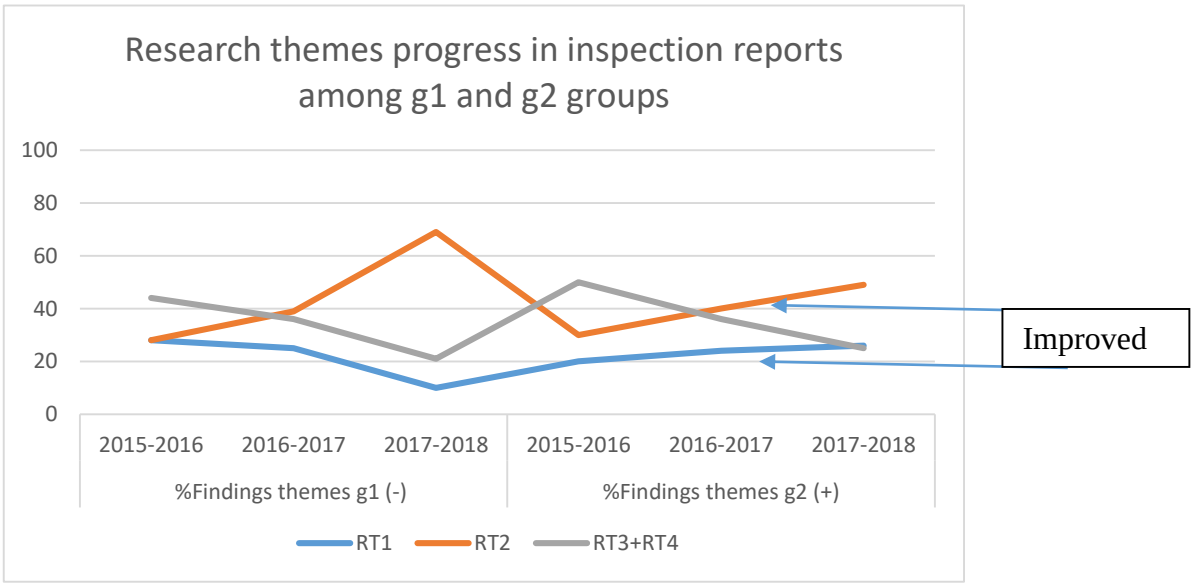


Chart 4.2 represents progress of the research themes found in inspection reports for grade 4 TIMSS 2015 and TIMSS 2011. It shows schools that have improved in their TIMSS results between 2011 and 2015; as the two blue arrows show, they have improved their modification of their curriculum (RT1) and that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.2.1.1 Maths domain

In the maths domain, there are two groups:

1- Group 1 which consists of (9) of the schools reports that have dropped in their TIMSS 2011 and 2015 grade 4 maths results.

2- Group 2 which consists of (69) of the schools reports that have improved in their TIMSS 2011 and 2015 grade 4 maths results.

Table 4.32 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4 maths for group 1 and group 2.

Table 4.32 Themes occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4 math g1 and g2

Themes	2015-2016 G4, g1	2016-2017 G4, g1	2017-2018 G4, g1	2015-2016 G4, g2	2016-2017 G4, g2	2017-2018 G4, g2
	M	M	M	M	M	M
TH1 (Assessment tests and use of Data)	4%	19%	35%	13%	26%	30%
TH2 (National Agenda Requirements)	17%	12%	10%	16%	14%	13%
TH3 (Lesson and curriculum planning)	11%	13%	7%	3%	7%	12%
TH4 (Teaching and teaching strategies)	22%	17%	27%	18%	16%	18%
TH5 (Students learning skills)	46%	39%	21%	50%	37%	27%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 4 in maths domain to the research themes. Table 4.33 represent these research themes.

Table 4.33 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 for g1 and g2 in maths domain

Research Themes	%Findings themes G4 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G4 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018

1-What actions the school have taken to improve and modify their curriculum? (RT1)	28	25	17	19	21	25
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	26	36	62	31	42	48
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	46	39	21	50	37	27

Chart 4.3 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 4 group 1 and group 2 for maths domain.

Chart 4.3 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 group1 and group 2 in maths domain

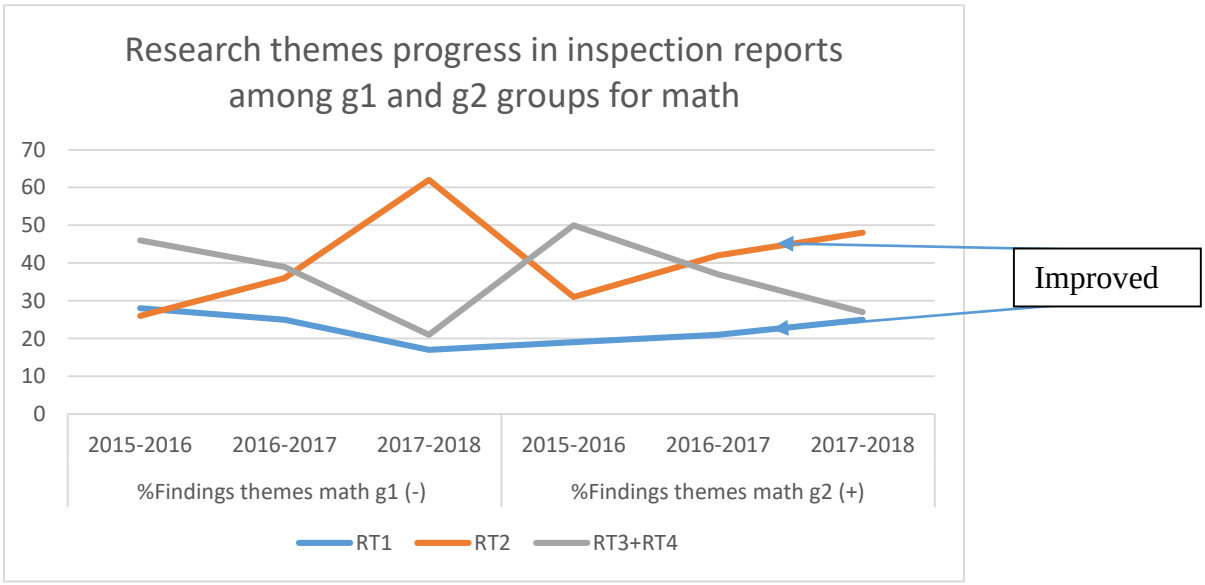


Chart 4.3 represents progress of the research themes found in inspection reports for grade 4 TIMSS 2015 and TIMSS 2011 for group 1 and group 2 in maths domain . It shows that schools have improved in their TIMSS results between 2011 and 2015, as the two blue arrows show

they have improved their modification of their curriculum (RT1) and that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.2.1.2 Science domain

In the science domain, there are two groups:

1- Group 1 which consists of (8) of the schools reports that have dropped in their TIMSS 2011 and 2015 grade 4 science results.

2- Group 2 which consists of (70) of the schools reports that have improved in their TIMSS 2011 and 2015 grade 4 science results.

Table 4.34 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4 science domain for group 1 and group 2.

Table 4.34 Themes occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 4 science domain for g1 and g2

Themes	2015-2016 G4, g1	2016-2017 G4, g1	2017-2018 G4, g1	2015-2016 G4, g2	2016-2017 G4, g2	2017-2018 G4, g2
	S	S	S	S	S	S
TH1 (Assessment tests and use of Data)	5%	29%	41%	12%	27%	30%
TH2 (National Agenda Requirements)	16%	7%	9%	14%	12%	13%
TH3 (Lesson and curriculum planning)	11%	10%	5%	6%	11%	13%
TH4 (Teaching and teaching strategies)	22%	19%	19%	18%	15%	16%
TH5 (Students' learning skills)	46%	35%	26%	50%	35%	28%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 4 in science domain to the research themes Table 4.35 represent these research themes.

Table 4.35 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 for g1 and g2 in science domain

Research Themes	%Findings themes G4 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G4 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	27	17	14	20	23	26
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	27	48	60	30	42	46
3-What are the students learning, and how students are developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	46	35	26	50	35	28

Chart 4.4 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 4 group 1 and group 2 for science domain.

Chart 4.4 Research themes for schools reports of grade 4 TIMSS 2015 and 2011 group1 and group 2 in science domain

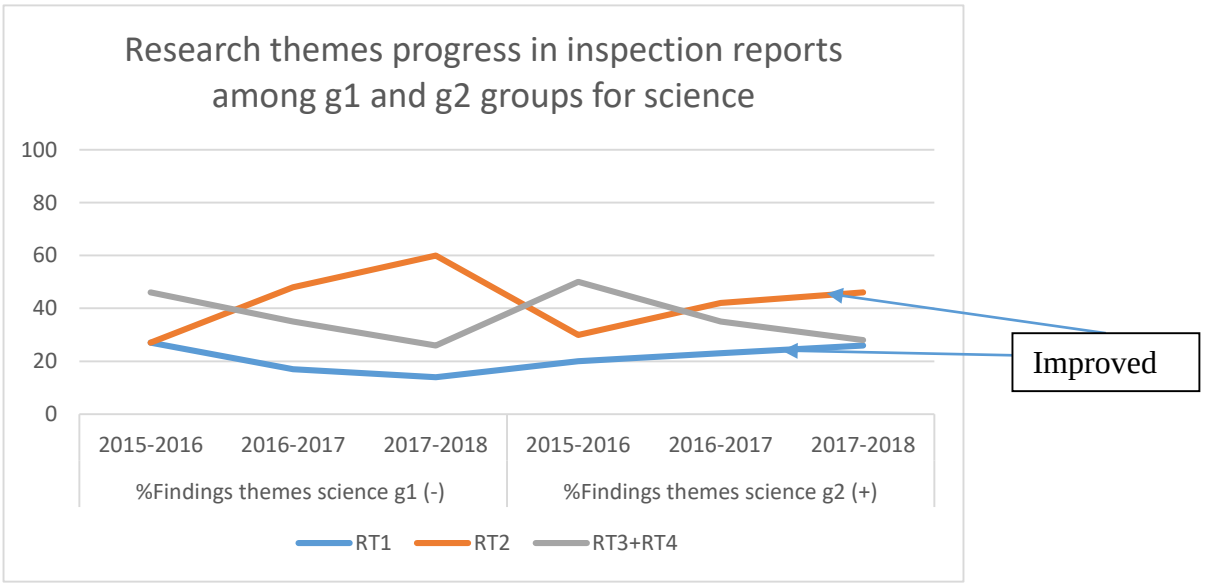


Chart 4.4 represents progress of the research themes found in inspection reports for grade 4 TIMSS 2015 and TIMSS 2011 for group 1 and group 2 in science domain. It shows that schools that have improved in their TIMSS results between 2011 and 2015, as the two blue arrows shows have improved their modification of their curriculum (RT1) and that teacher have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.2.2 Grade 8 results

There were two groups in each of the analysis:

1- Group 1, which consists of (11) of the schools reports for schools that have dropped in their results from TIMSS 2015 to 2011 grade 8.
2- Group 2, which consists of (59) of the schools reports for schools that have improved in their results from TIMSS 2015 to 2015 grade 8.

Table 4.36 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8 for group 1 and group 2.

Table 4.36 Themes occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8, g1 and g2

Themes	2015-2016 G8, g1	2016-2017 G8, g1	2017-2018 G8, g1	2015-2016 G8, g2	2016-2017 G8, g2	2017-2018 G8, g2
TH1 (Assessment tests and use of Data)	5%	22%	24%	13%	24%	33%
TH2 (National Agenda Requirements)	20%	6%	14%	17%	14%	13%
TH3 (Lesson and curriculum planning)	6%	14%	11%	6%	9%	12%
TH4 (Teaching and teaching strategies)	32%	24%	13%	14%	17%	18%
TH5 (Students' learning skills)	37%	34%	38%	50%	36%	24%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 8 to the research themes. In Table 4.37, the research themes are presented.

Table 4.37 Research themes for schools reports of grade 8 TIMSS 2015 and 2011 for g1 and g2

Research Themes	%Findings themes G8 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G8 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	26	20	25	23	23	25

2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	37	46	37	27	41	51
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources are the schools purchased to support the changes in teaching strategies? (RT4)	37	34	38	50	36	24

Chart 4.5 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 8 group 1 and group 2.

Chart 4.5 Research themes for schools reports of G8 TIMSS 2015 and 2011 group1 and group 2

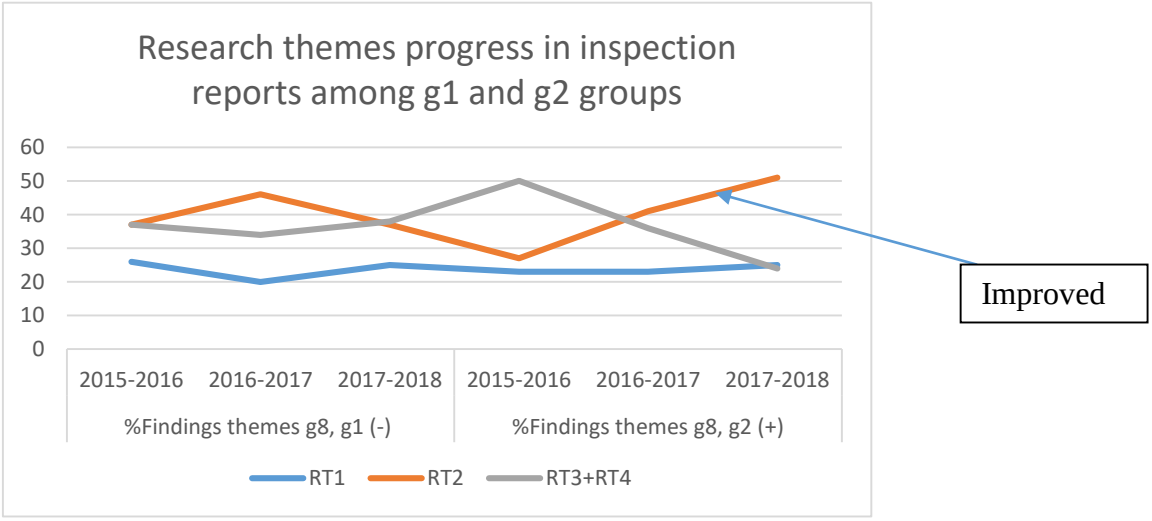


Chart 4.5 represents the progress of the research themes found in inspection reports for grade 8 TIMSS 2015 and TIMSS 2011. It shows that schools have improved in their TIMSS results between 2011 and 2015, as the blue arrow shows that schools have improved their teachers' practices (RT2) and have included critical thinking, research and investigation skills, but are yet to improve their curriculum (RT1). While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.2.2.1 Maths domain

In the maths domain, there are two groups:

1- Group 1 which consists of (14) of the schools reports that have dropped in their TIMSS 2011 and 2015 grade 8 maths results.

2- Group 2 which consists of (56) of the schools reports that have improved in their TIMSS 2011 and 2015 grade 8 maths results.

Table 4.38 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8 in maths domain.

Table 4.38 Themes' occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8 math for g1 and g2

Themes	2015-2016 G8, g1	2016-2017 G8, g1	2017-2018 G8, g1	2015-2016 G8, g2	2016-2017 G8, g2	2017-2018 G8, g2
	M	M	M	M	M	M
TH1 (Assessment tests and use of Data)	14%	21%	27%	13%	26%	32%
TH2 (National Agenda Requirements)	15%	6%	14%	16%	12%	14%
TH3 (Lesson and curriculum planning)	13%	11%	19%	6%	8%	11%
TH4 (Teaching and teaching strategies)	24%	22%	13%	17%	19%	19%
TH5 (Students' learning skills)	34%	40%	27%	48%	35%	24%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 8 in maths domain to the research themes. In Table 4.39, the research themes are presented.

Table 4.39 Research themes for schools reports of grade 8 TIMSS 2015 and 2011 for g1 and g2 in maths domain

Research Themes	%Findings themes G8 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G8 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	28	17	33	22	20	25
2-What practices are teachers especially in maths, science and reading are using in their classrooms to include critical thinking, research and investigation skills? (RT2)	38	43	40	30	45	51
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	34	40	27	48	35	24

Chart 4.6 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 8 group 1 and group 2 in maths domain.

Chart 4.6 Research themes for schools reports of grade 8 TIMSS 2015 and 2011 group1 and group 2 in maths domain

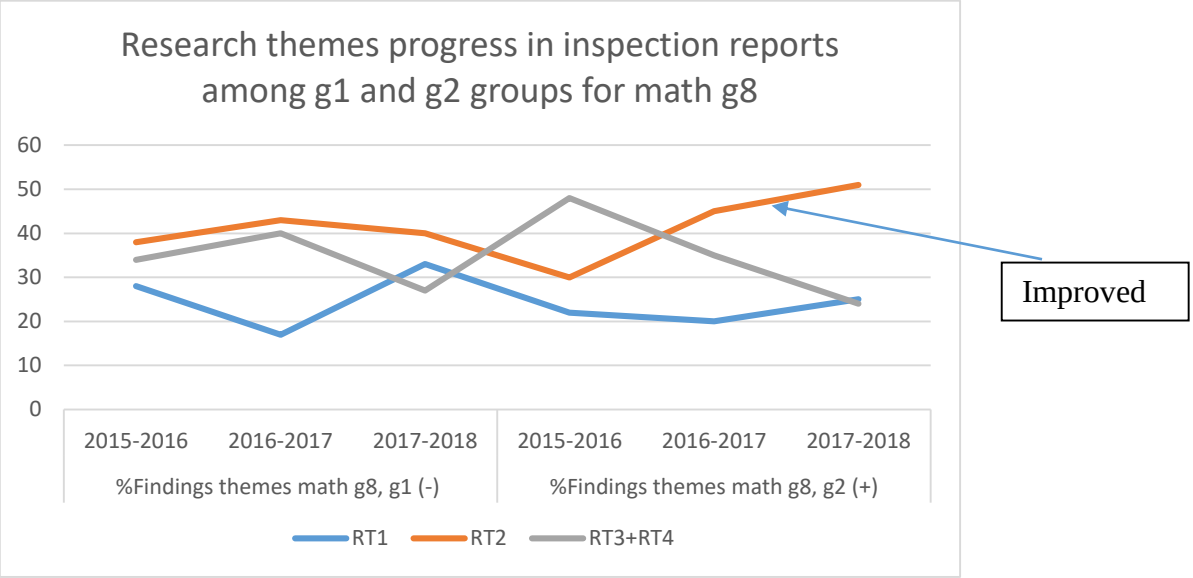


Chart 4.6 represents progress of the research themes found in inspection reports for grade 8 TIMSS 2015 and TIMSS 2011 in maths domain. It shows that schools have improved in their TIMSS results between 2011 and 2015, as the blue arrow shows that schools have improved their teachers practices (RT2) and have included critical thinking, research and investigation skills, and are yet to improve their curriculum (RT1). While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.2.2.2 Science domain

In the science domain, there are two groups:

1- Group 1 which consists of (11) of the schools reports that have dropped in their TIMSS 2011 and 2015 grade 8 science results.

2- Group 2 which consists of (59) of the schools reports that have improved in their TIMSS 2011 and 2015 grade 8 science results.

Table 4.40 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8 in science domains.

Table 4.40 Themes occurrence in the three academic years of inspection reports for the difference between TIMSS 2015 and TIMSS 2011 for grade 8 science domain for g1 and g2

Themes	2015-2016 G8, g1	2016-2017 G8, g1	2017-2018 G8, g1	2015-2016 G8, g2	2016-2017 G8, g2	2017-2018 G8, g2
	S	S	S	S	S	S
TH1 (Assessment tests and use of Data)	5%	22%	34%	14%	26%	32%
TH2 (National Agenda Requirements)	13%	6%	14%	15%	13%	13%
TH3 (Lesson and curriculum planning)	4%	10%	9%	9%	10%	11%
TH4 (Teaching and teaching strategies)	37%	21%	11%	14%	16%	20%
TH5 (Students' learning skills)	41%	41%	32%	48%	35%	24%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of grade 8 in science domain to the research themes. In Table 4.41, the research themes are presented.

Table 4.41 Research themes for schools reports of grade 8 TIMSS 2015 and 2011 for group 1 and group 2 in science domain

Research Themes	%Findings themes G8 TIMSS 2015 and 2011 group 1 (Dropped)			%Findings themes G8 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	17	16	23	23	23	24
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	42	43	45	29	42	52
3-What are the students learning, and how are students developing their skills to manage their own learning, use	41	41	32	48	35	24

of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)						

Chart 4.7 represents the increase or decrease of any of the research themes in TIMSS 2015 and 2011 grade 8 group 1 and group 2 in science domain.

Chart 4.7 Research themes for schools reports of G8 TIMSS 2015 and 2011 group1 and group 2 in science domain

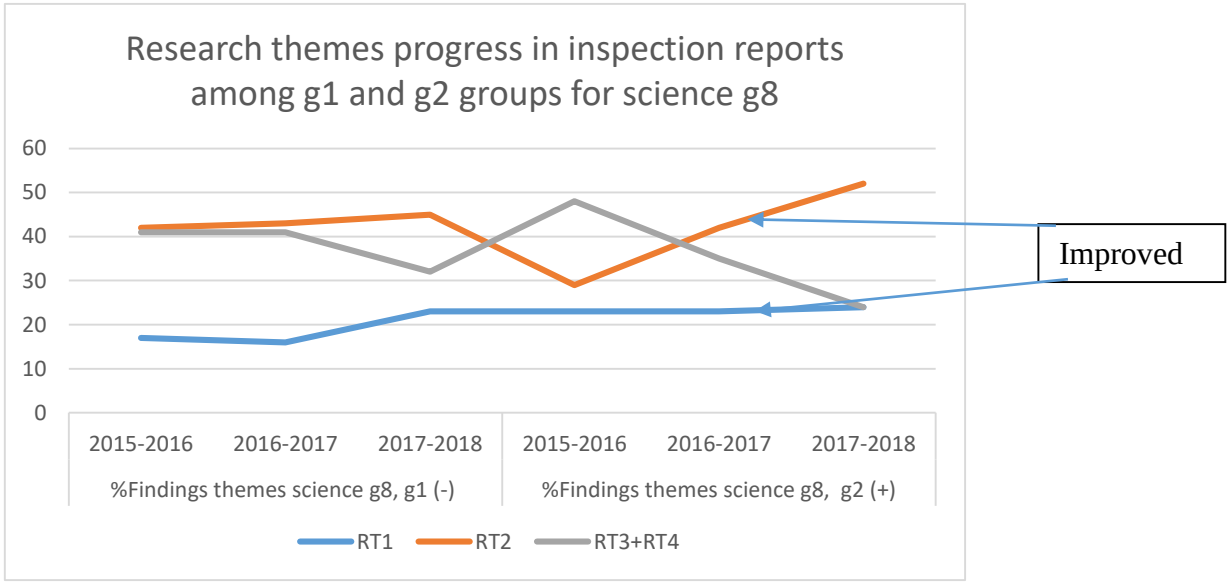


Chart 4.7 represents progress of the research themes found in inspection reports for grade 8 TIMSS 2015 and TIMSS 2011 in science domain. It shows that schools that have improved in their TIMSS results between 2011 and 2015 in science domain, as the two blue arrows shows schools have improved their modification of their curriculum (RT1) and that teacher have made a little improvement in their practices (RT2) to included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.3 Analysis of the inspection reports for schools participated in PISA 2012 and 2015 test

Analysis using NVivo for the (68) schools inspection reports that have results for PISA for the years 2012 and 2015 was performed for the three academic years 2015-2016, 2016-2017 and 2017-2018 for inspection reports that was published on the KHDA website for the content that is related to the National Agenda target. The previous themes were found in this analysis. There were two groups in each analysis:

1- Group 1 which consists of (26) of the schools reports that have dropped in their PISA 2012 and 2015 results.
2- Group 2 which consists of (42) of the schools reports that have improved in their PISA 2012 and 2015 results.

Table 4.42 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 for group 1 and group 2.

Table 4.42 Themes occurrence in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 for g1 and g2

Theme	2015-2016 g1	2016-2017 g1	2017-2018 g1	2015-2016 g2	2016-2017 g2	2017-2018 g2
TH1 (Assessment tests and use of Data)	9%	29%	42%	12%	21%	24%
TH2 (National Agenda Requirements)	16%	16%	12%	14%	14%	15%
TH3 (Lesson and curriculum planning)	3%	9%	7%	8%	7%	14%
TH4 (Teaching and teaching strategies)	13%	13%	14%	21%	20%	20%
TH5 (Students' learning skills)	59%	33%	25%	45%	38%	27%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group 1 and group 2 of PISA 2015 and PISA 2012 to the research themes. In Table 4.43 the research themes are presented.

Table 4.43 Research themes for schools reports of PISA 2015 and PISA 2012 g1 and g2

Research Themes	%Findings themes PISA 2015 and PISA 2012 group 1 (Dropped)			%Findings themes PISA 2015 and PISA 2012 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the schools taken to improve and modify their curriculum? (RT1)	19	25	19	22	21	29
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	22	42	56	33	41	44
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	59	33	25	45	38	27

Chart 4.8 represents the increase or decrease of any of the research themes in PISA 2015 and PISA 2012 for group 1 and group 2.

Chart 4.8 Research themes for schools reports of PISA 2015 and PISA 2012 group1 and group 2

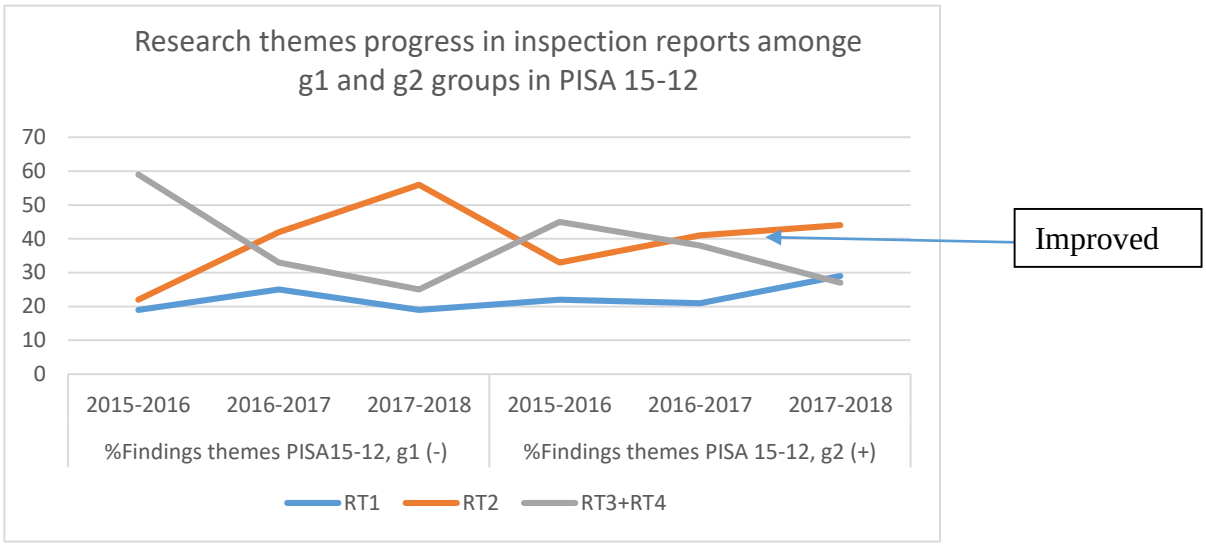


Chart 4.8 represents progress of the research themes found in inspection reports for PISA 2015 and PISA 2012. It shows that schools that have improved in their PISA results between 2012 and 2015, the blue arrow shows that teacher have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.3.1 Math domain

In the maths domain, there are two groups:

1- Group 1 which consists of (32) of the schools reports that have dropped in their PISA 2012 and 2015 math results.
2- Group 2 which consists of (36) of the schools reports that have improved in their PISA 2012 and 2015 math results.

Table 4.44 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 for maths domain.

Table 4.44 Themes occurrence in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 in maths domain for g1 and g2

Theme	2015 - 2016 g1	2016 - 2017 g1	2017 - 2018 g1	2015 - 2016 g2	2016 - 2017 g2	2017 - 2018 g2
	M	M	M	M	M	M
TH1 (Assessment tests and use of Data)	14	21	27	13	26	32
TH2 (National Agenda Requirements)	15	6	14	16	12	14
TH3 (Lesson and curriculum planning)	13	11	19	6	8	11
TH4 (Teaching and teaching strategies)	24	22	13	17	19	19
TH5 (Students' learning skills)	34	40	27	48	35	24

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of PISA 2015 and PISA 2012 in the maths domain to the research themes. In Table 4.45 the research themes are presented.

Table 4.45 Research themes for schools reports of PISA 2015 and 2012 in math domain for g1 and g2

Research Themes	%Findings themes PISA 2015 and PISA 2012 group 1 (Dropped)			%Findings themes PISA 2015 and PISA 2012 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	28	17	33	22	20	25
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	38	43	40	30	45	51

3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	34	40	27	48	35	24

Chart 4.9 represents the increase or decrease of any of the research themes in PISA 2015 and PISA 2012 in math domain for group 1 and group 2.

Chart 4.9 Research themes for schools reports of PISA 2015 and PISA 2012 in math domain for group1 and group 2

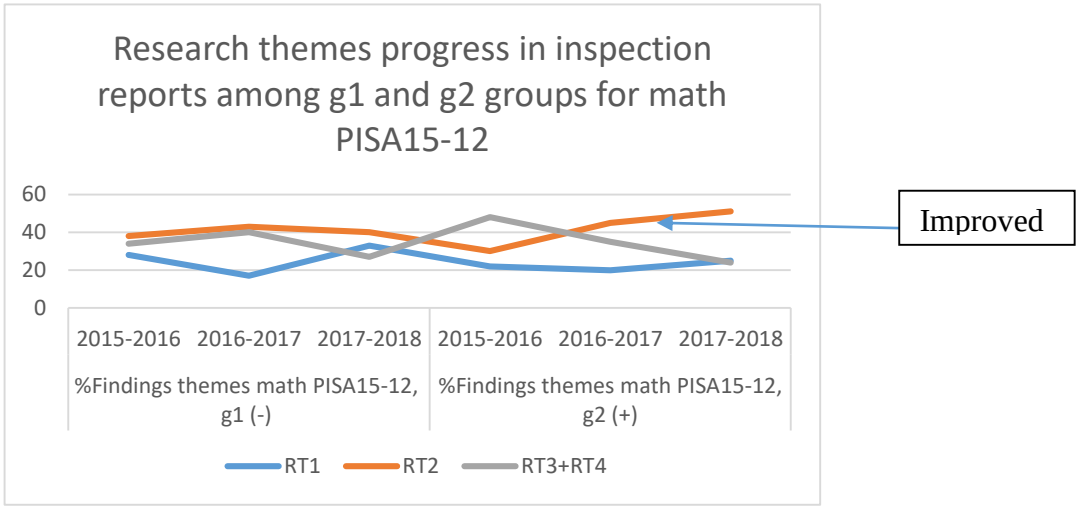


Chart 4.9 represents progress of the research themes found in inspection reports for PISA 2015 and PISA 2012 in maths domain. It shows that schools that have improved in their PISA results between 2012 and 2015, as the blue arrow shows that teacher have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.3.2 Science domain

For the science domain, there are two groups;

1- Group 1 which consists of (22) of the schools reports that have dropped in their PISA 2012 and 2015 science results.
2- Group 2 which consists of (46) of the schools reports that have improved in their PISA 2012 and 2015 science results.

Table 4.46 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 for science domains.

Table 4.46 Themes occurrence in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 in science domains for g1 and g2

Theme	2015-2016 g1	2016-2017 g1	2017-2018 g1	2015-2016 g2	2016-2017 g2	2017-2018 g2
	S	S	S	S	S	S
TH1 (Assessment tests and use of Data)	5	22	34	14	26	32
TH2 (National Agenda Requirements)	13	6	14	15	13	13
TH3 (Lesson and curriculum planning)	4	10	9	9	10	11
TH4 (Teaching and teaching strategies)	37	21	11	14	16	20
TH5 (Students' learning skills)	41	41	32	48	35	24

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group1 and group 2 of PISA 2015 and PISA 2012 in science domain to the research themes. In Table 4.47 the research themes are presented.

Table 4.47 Research themes for schools reports of PISA 2015 and 2012 in science domain for g1 and g2

Research Themes	%Findings themes PISA 2015 and PISA 2012 group 1 (Dropped)			%Findings themes PISA 2015 and PISA 2012 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	17	16	23	24	23	24
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	42	43	45	28	42	52
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	41	41	32	48	35	24

Chart 4.10 represents the increase or decrease of any of the research themes in PISA 2015 and PISA 2012 in science domain for group 1 and group 2.

Chart 4.10 Research themes for schools reports of PISA 2015 and PISA 2012 in science domain for group1 and group 2

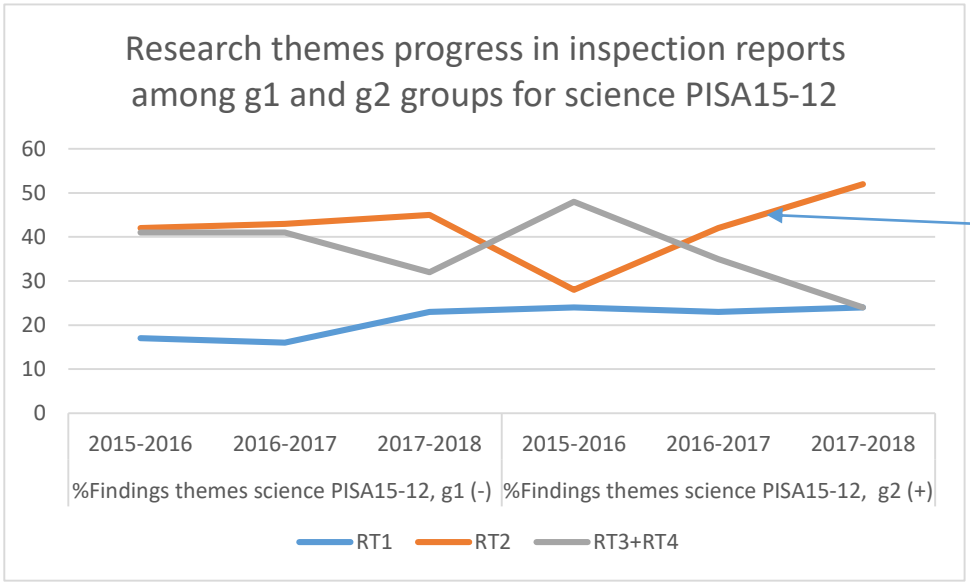


Chart 4.10 represents progress of the research themes found in inspection reports for PISA 2015 and PISA 2012 in science domain. It shows that schools that have improved in their PISA results between 2012 and 2015, as the blue arrow shows that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.3.3 Reading domain

In the reading domain, there are two groups:

1- Group 1 which consists of (27) of the schools reports that have dropped in their PISA 2012 and 2015 reading results.
2- Group 2 which consists of (41) of the schools reports that have improved in their PISA 2012 and 2015 reading results.

Table 4.48 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 for reading.

Table 4.48 Themes occurrence in the three academic years of inspection reports for the difference between PISA 2015 and PISA 2012 in reading domain for g1 and g2

Theme	2015-2016 g1	2016-2017 g1	2017-2018 g1	2015-2016 g2	2016-2017 g2	2017-2018 g2
	R	R	R	R	R	R
TH1 (Assessment tests and use of Data)	5	22	34	14	26	32
TH2 (National Agenda Requirements)	13	6	14	15	13	13
TH3 (Lesson and curriculum planning)	4	10	9	9	10	11
TH4 (Teaching and teaching strategies)	37	21	11	14	16	20
TH5 (Students' learning skills)	41	41	32	48	35	24

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018 in reading for group 1 and group 2 of PISA 2015 and PISA 2012 to the research themes. In Table 4.49 the research themes are presented.

Table 4.49 Research themes for schools reports of PISA 2015 and 2012 in reading domain for g1 and g2

Research Themes	%Findings themes PISA 2015 and PISA 2012 group 1 (Dropped)			%Findings themes PISA 2015 and PISA 2012 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions the have school taken to improve and modify their curriculum? (RT1)	17	16	23	24	23	24
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	42	43	45	28	42	52
3-What are the students learning, and how students are developing their skills to manage their own learning, use	41	41	32	48	35	24

of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)						

Chart 4.11 represents the increase or decrease of any of the research themes in PISA 2015 and PISA 2012 in reading domain for group 1 and group 2.

Chart 4.11 Research themes for schools reports of PISA 2015 and PISA 2012 in reading domain for group1 and group 2

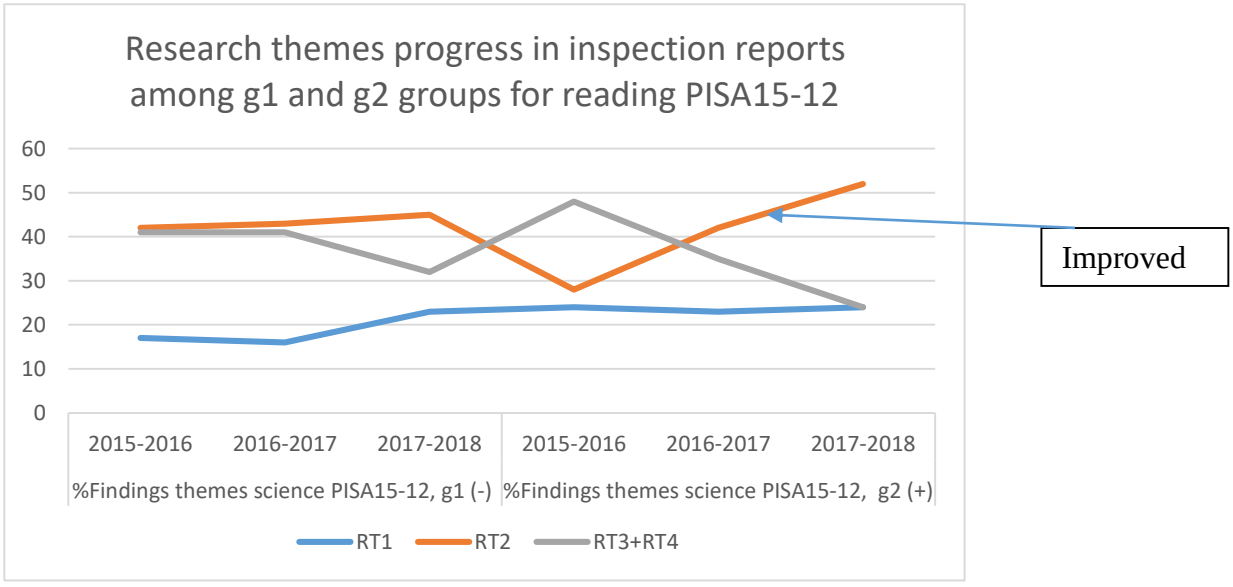


Chart 4.11 represents the progress of the research themes found in inspection reports for PISA 2015 and PISA 2012 in reading domain. It shows that schools that have improved in their PISA results between 2012 and 2015, as the blue arrow shows that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.4 Analysis of the inspection reports for schools participated in PBTS 2017 and PISA 2015 results

Analysis using NVivo for the (65) schools inspection reports that have results for PISA for the years 2015 and PBTS 2017 were performed for the three academic years 2015-2016, 2016-2017 and 2017-2018 for inspection reports that was published on the KHDA website for the content that is related to the National Agenda targets. The previous themes were found in this analysis. There were two groups in each analysis:

1- Group 1 which consists of (24) of the schools reports that have dropped in their PISA 2015 and PBTS 2017 results.
2- Group 2 which consists of (41) of the schools reports that have improved in their PISA 2015 and PBTS 2017 results.

Table 4.50 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 for group 1 and group 2.

Table 4.50 Themes' occurrence in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 for g1 and g2

Themes	2015-2016 g1	2016-2017 g1	2017-2018 g1	2015-2016 g2	2016-2017 g2	2017-2018 g2
TH1 (Assessment tests and use of Data)	18%	25%	29%	7%	25%	34%
TH2 (National Agenda Requirements)	14%	12%	8%	16%	13%	14%
TH3 (Lesson and curriculum planning)	7%	6%	11%	7%	11%	13%
TH4 (Teaching and teaching strategies)	15%	18%	25%	24%	15%	13%
TH5 (Students learning skills)	46%	39%	27%	46%	36%	26%

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018, for group 1 and group 2 of PBTS 2017 and PISA 2015 to the research themes. In Table 4.51 the research themes are presented.

Table 4.51 Research themes for schools reports of PBTS 2017 and PISA 2015 for g1 and g2

Research Themes	%Findings themes PBTS 2017 and PISA 2015 group 1 (Dropped)			%Findings themes PBTS 2017 and PISA 2015 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the schools taken to improve and modify their curriculum? (RT1)	21	18	19	23	24	27
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	33	43	54	31	40	47
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	46	39	27	46	36	26

Chart 4.12 represents the increase or decrease of any of the research themes in PBTS 2017 and PISA 2015 for group 1 and group 2.

Chart 4.12 Research themes for schools reports of PBTS 2017 and PISA 2015 for group1 and group 2

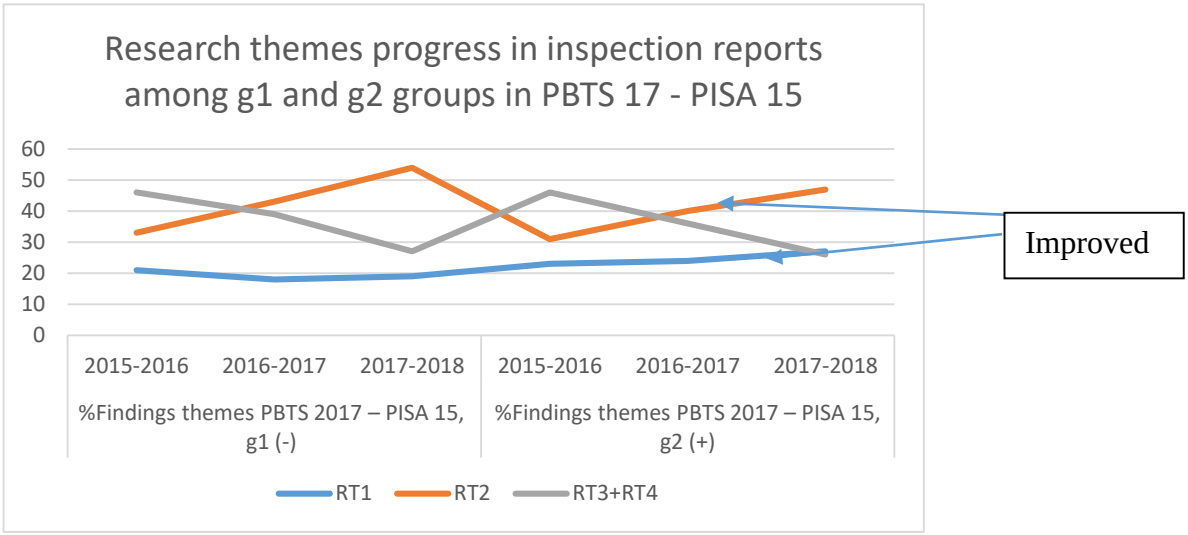


Chart 4.12 represents progress of the research themes found in inspection reports for PBTS 2017 and PISA 2015. It shows that schools have improved in their results between PBTS 2017 and PISA 2015, as the two blue arrows show that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. In addition, to improving their modification of their curriculum (RT1). While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.4.1 Maths domain

For maths domain, there are two groups:

1- Group 1 which consists of (17) of the schools reports that have dropped in their PISA 2015 and PBTS 2017 maths results.
2- Group 2 which consists of (48) of the schools reports that have improved in their PISA 2015 and PBTS 2017 maths results.

Table 4.52 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 for maths domain for group 1 and group 2.

Table 4.52 Themes' occurrence in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 in math domain for g1 and g2

Theme	2015-2016 g1	2016-2017 g1	2017-2018 g1	2015-2016 g2	2016-2017 g2	2017-2018 g2
	M	M	M	M	M	M
TH1 (Assessment tests and use of Data)	14	23	31	8	23	31
TH2 (National Agenda Requirements)	16	12	14	14	12	14
TH3 (Lesson and curriculum planning)	9	12	12	7	12	12
TH4 (Teaching and teaching strategies)	15	16	18	21	16	18
TH5 (Students' learning skills)	46	37	25	50	37	25

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018 in maths domain, for group 1 and group 2 of PBTS 2017 and PISA 2015 to the research themes. In Table 4.53 the research themes are presented.

Table 4.53 Research themes for schools reports of PBTS 2017 and PISA 2015 in maths domain for g1 and g2

Research Themes	%Findings themes PBTS 2017 and PISA 2015 group 1 (Dropped)			%Findings themes PBTS 2017 and PISA 2015 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the schools taken to improve and modify their curriculum? (RT1)	25	24	26	21	24	26
2-What practices are teachers' especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	29	39	49	29	39	49
3-What are the students learning, and how are students developing their skills to manage their	46	37	25	50	37	25

own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)						

Chart 4.13 represents the increase or decrease of any of the research themes in PBTS 2017 and PISA 2015 in math domain for group 1 and group 2.

Chart 4.13 Research themes for schools reports of PBTS 2017 and PISA 2015 in math domain for g1 and g2

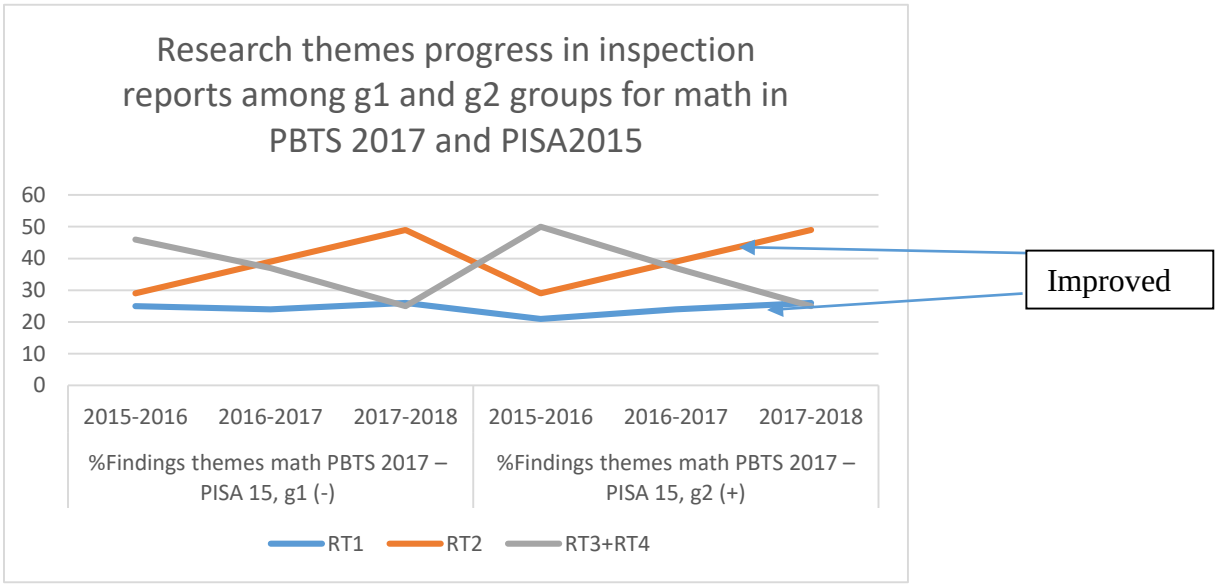


Chart 4.13 represents progress of the research themes found in inspection reports for PBTS 2017 and PISA 2015 in maths domain. It shows that schools have improved in their results between PBTS 2017 and PISA 2015, as the two blue arrows show that teacher have improved their practices (RT2) and have included critical thinking, research and investigation skills. In addition, to improve their modification of their curriculum (RT1). While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.4.2 Science domain

For the science domain, there are two groups:

1- Group 1 which consists of (24) of the schools reports that have dropped in their PISA 2015 and PBTS 2017 science results.
2- Group 2 which consists of (41) of the schools reports that have improved in their PISA 2015 and PBTS 2017 science results.

Table 4.54 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 for science domain.

Table 4.54 Themes occurrence in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 in science domains for g1 and g2

Theme	2015 - 2016 g1	2016 - 2017 g1	2017 - 2018 g1	2015 - 2016 g2	2016 - 2017 g2	2017 - 2018 g2
	S	S	S	S	S	S
TH1 (Assessment tests and use of Data)	13	21	30	9	22	33
TH2 (National Agenda Requirements)	13	14	9	18	13	14
TH3 (Lesson and curriculum planning)	7	7	17	6	9	11
TH4 (Teaching and teaching strategies)	19	16	21	14	18	21
TH5 (Students' learning skills)	48	42	23	53	38	21

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018 in science domain for group 1 and group 2 of PBTS 2017 and PISA 2015 to the research themes. In Table 4.55 the research themes are presented.

Table 4.55 Research themes for schools reports of PBTS 2017 and PISA 2015 in science domain for g1 and g2

Research Themes	%Findings themes PBTS 2017 and PISA 2015 group 1 (Dropped)			% Findings themes PBTS 2017 and PISA 2015 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the schools taken to improve and modify their curriculum? (RT1)	20	21	26	24	22	25
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	32	37	51	23	40	54
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	48	42	23	53	38	21

Chart 4.14 represents the increase or decrease of any of the research themes in PBTS 2017 and PISA 2015 in science domain for group 1 and group 2.

Chart 4 14 Research themes for schools reports of PBTS 2017 and PISA 2015 in science domain for g1 and g2

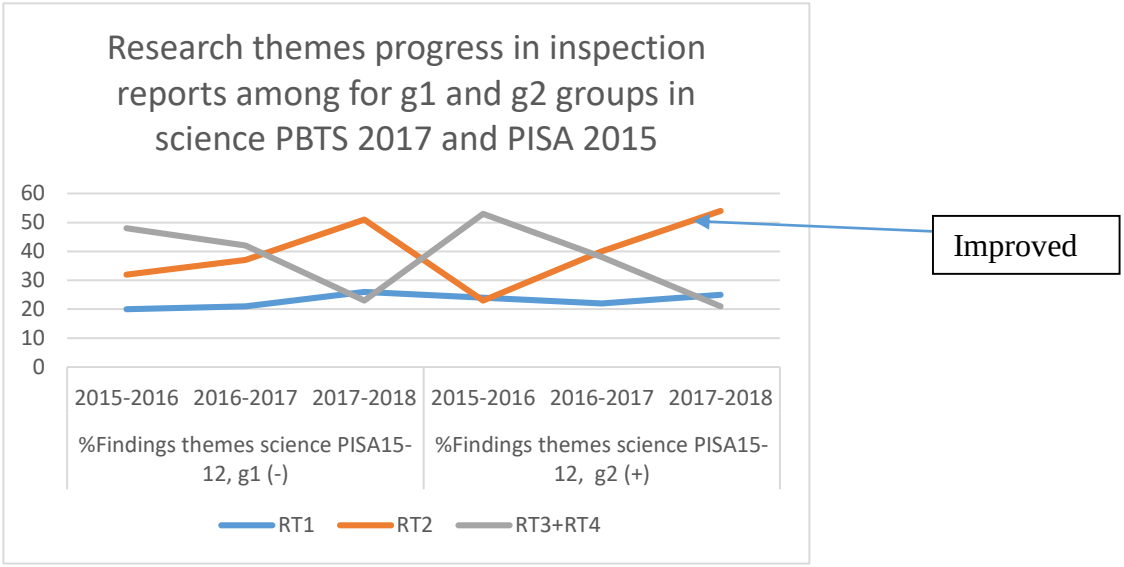


Chart 4.14 represents progress of the research themes found in inspection reports for PBTS 2017 and PISA 2015 in science domain. It shows that schools have improved in their results between PBTS 2017 and PISA 2015, as the blue arrow show that teachers have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, learning skills and improvement of resources have shown a drop from one year to another.

4.5.4.3 Reading domain

In the reading domain, there are two groups;

1- Group 1 which consists of (28) of the schools reports that have dropped in their PISA 2012 and PBTS 2017 reading results.
2- Group 2 which consists of (37) of the schools reports that have improved in their PISA 2012 and PBTS 2017 reading results.

Table 4.56 shows the percentage of the occurrence of the following themes in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 for reading domains.

Table 4.56 Themes' occurrence in the three academic years of inspection reports for the difference between PBTS 2017 and PISA 2015 in reading domain for g1 and g2

Theme	2015 - 2016 g1	2016 - 2017 g1	2017 - 2018 g1	2015 - 2016 g2	2016 - 2017 g2	2017 – 2018 g2
	R	R	R	R	R	R
TH1 (Assessment tests and use of Data)	14	25	25	7	27	35
TH2 (National Agenda Requirements)	13	14	15	18	13	14
TH3 (Lesson and curriculum planning)	6	8	14	8	10	8
TH4 (Teaching and teaching strategies)	19	17	21	18	17	16
TH5 (Students' learning skills)	48	36	25	49	33	27

To correlate the analysis of the finding themes of school inspection reports over three academic years 2015-2016, 2016-2017 and 2017-2018 in reading for group 1 and group 2 of PBTS 2017 and PISA 2015 to the research themes. In Table 4.57 the research themes are presented.

Table 4.57 Research themes for schools reports of PBTS 2017 and PISA 2015 in reading domain for g1 and g2

Research Themes	% Findings themes PBTS 2017 and PISA 2015 group 1 (Dropped)			% Findings themes PBTS 2017 and PISA 2015 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the schools taken to improve and modify their curriculum? (RT1)	19	22	29	26	23	22
2-What practices are teachers especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	33	42	46	25	44	51

3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	48	36	25	49	33	27

Chart 4.15 represents the increase or decrease of any of the research themes in PBTS 2017 and PISA 2015 in reading domain for group 1 and group 2.

Chart 4.15 Research themes for schools reports of PBTS 2017 and PISA 2015 in reading domain for g1 and g2

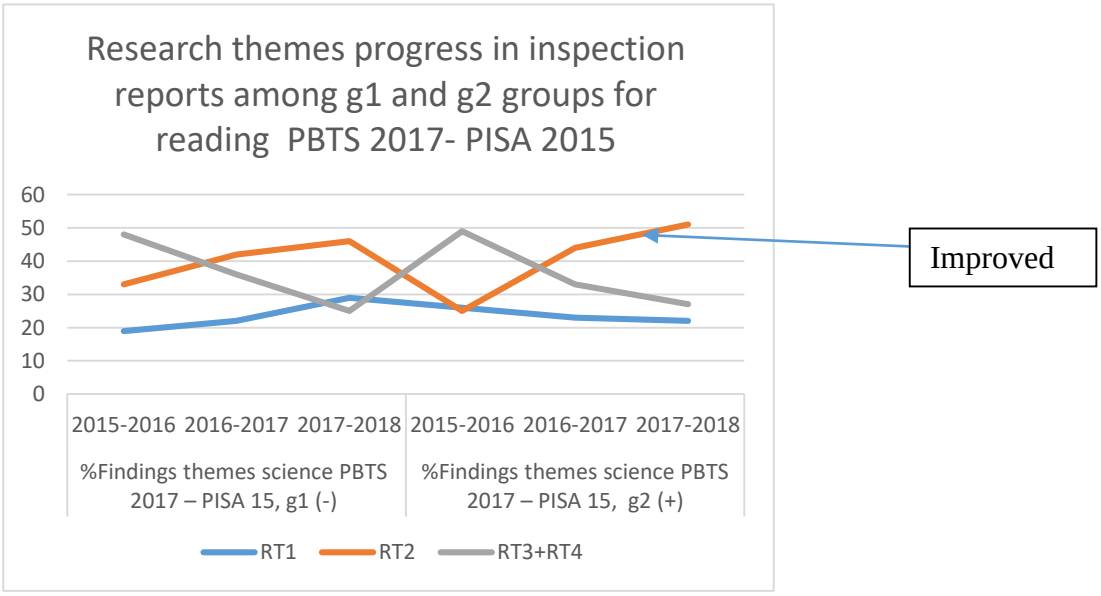


Chart 4.15 represents progress of the research themes found in inspection reports for PBTS 2017 and PISA 2015 in reading domain. It shows that schools have improved in their PBTS 2017 and PISA 2015 results, as the blue arrow shows that teacher have improved their practices (RT2) and have included critical thinking, research and investigation skills. While, (RT1) and (RT3) have shown a drop from one year to another.

4.5.5 Summary of the qualitative analysis of the school inspection reports for three academic years 2015-2016, 2016-2017 and 2017-2018

Table 4.58 summarised the above finding regarding the qualitative analysis for the National Agenda section in each school's inspection reports in the three academic years 2015-2016, 2016-2017 and 2017-2018 for schools that participated in the below tests:

1- TIMSS 2011 and 2015 rounds for grade 4 and grade 8 in maths and science domains.

2- PISA 2015 and PISA 2012 rounds for maths, science and reading domains.

3- PBTS 2017 and PISA 2015 rounds for maths, science and reading domains.

Table 4.58 Summary of research themes found in the TIMSS, PISA and PBTS tests

Test type	Research themes found in improved groups to improve over time
TIMSS 2011-2015 G4	- Schools improve and modify their curriculum (RT1) - Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
TIMSS 2011-2015 G4 math domain	- Schools improve and modify their curriculum (RT1) - Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
TIMSS 2011-2015 G4 science domain	- Schools improve and modify their curriculum (RT1) - Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
TIMSS 2011-2015 G8	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
TIMSS 2011-2015 G8 maths domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
TIMSS 2011-2015 G8 science domain	- Schools improve and modify their curriculum (RT1)

	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PISA 2012-2015	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PISA 2012-2015 math domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PISA 2012-2015 science domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PISA 2012-2015 reading domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PBTS 2017- PISA 2015	- Schools improve and modify their curriculum (RT1) - Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PBTS 2017 – PISA 2015 maths domain	- Schools improve and modify their curriculum (RT1) - Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PBTS 2017- PISA 2015 science domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)
PBTS 2017- PISA 2015 reading domain	- Teachers' practices especially in maths, science and reading to include critical thinking, research and investigation skills. (RT2)

4.6 Chapter summary

This chapter has explained the selection of the research sample schools' results from the overall population for TIMSS 2011 and 2015, PISA 2012 and 2015 and PBTS 2017. The principals'

perceptions and the school inspection reports for the schools that participated in the above tests were collected over the academic years 2015-2016, 2016-2017 and 2017-2018. Using the mixed methods the research data were analysed quantitatively and qualitatively. The results of the simple statistical analysis were conducted on the TIMSS 2011 and 2015, PISA 2012 and 2015 and PBTS 2017 results, then a quantitative t-test and ANOVA test were implemented on the same results. The principals' surveys were statistically analysed. The school inspection reports were qualitatively analysed into themes across the different academic years through the TIMSS grades 4 and 8 for maths and science domains and for PISA, PBTS for maths, science and reading domains.

CHAPTER 5: Discussion

5.1 Introduction

This chapter discusses the findings presented in the previous chapter to address the research questions. Each of the research questions is discussed separately and then the results are triangulated to check if the evidence collected answers the main research questions and achieve the research objectives. The researcher will use literature to support the findings and the answers to each of the research questions. The ultimate goal of this study is to examine the progress that private schools in Dubai have achieved in applying the National Agenda targets in order to provide recommendations to help improve the implementation of National Agenda. The research questions are as below:

1- Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?

2- Is there any significant difference between the results of Dubai private schools in PISA 2012, 2015 and PBTS 2017 tests?

3- What are the principals' perceptions of the implementation of the National Agenda Policy in their schools?

4- Is there any progress by private schools in Dubai towards achieving the National Agenda targets, in their yearly inspection reports for the years 2015-2016, 2016-2017 and 2017-2018?

5.2 Is there any significant difference between TIMSS 2011 and 2015 results

To answer research question one, the researcher will use the data analysed from the statistical analysis, quantitative independent t-test and ANOVA test in the previous chapter to answer this question.

5.2.1 Statistical analysis findings

Table 4.3 showed that (88%) of the schools have improved their TIMSS results between 2011 to 2015 in grade 4 maths domain and (90%) in science domain. In addition, (80%) of the schools improved their TIMSS results between 2011 and 2015 in grade 8 maths and (84%) improved in science domain.

5.2.2 t-Test findings

Tables 4.9 and 4.10 showed the t-test analysis for TIMSS grade 4 and grade 8 in 2011 and 2015 for maths and science domains. The findings in these tables show that the results of grade 4 maths in TIMSS 2015 (512.4 ± 63.48) are higher than for grade 4 maths in TIMSS 2011 (465.21 ± 64.47), a statistically significant difference of 10.26 at 99.9% confidence interval, t (154) = -4.60, p= 0.00 ($p < 0.001$). The results for grade 4 science in TIMSS 2015 (518.27 ± 66.58) are higher than grade 4 science in TIMSS 2011 (455.41 ± 72.41), a statistically significant difference of 11.14 at 99.9% confidence interval, t (154) = -5.65, p= 0.00 ($p < 0.001$). The findings of the results for grade 8 maths in TIMSS 2015 (514.76 ± 60.3) are higher than grade 8 maths in TIMSS 2011 (479.34 ± 58.19), a statistically significant difference of 10.02 at 99.9% confidence interval, t (138) = -3.54, p= 0.001 ($p < 0.001$). The results for grade 8 science in TIMSS 2015 (526.06 ± 61.5) are higher than grade 8 science in TIMSS 2011 (483.23 ± 66.05), a statistically significant difference of 10.79 at 99.9% confidence interval, t (138) = -3.97, p= 0.000 ($p < 0.001$).

5.2.3 ANOVA findings

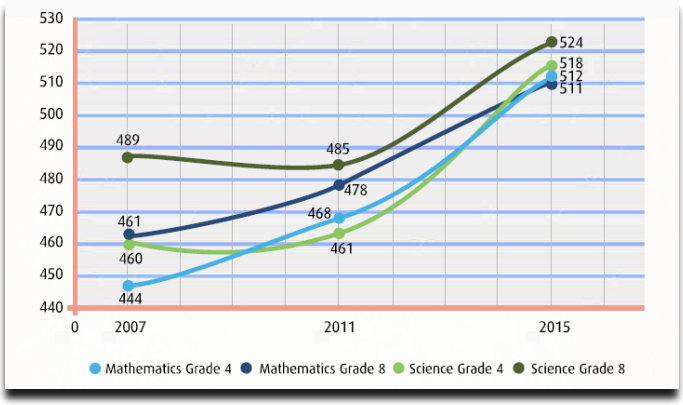
Tables 4.11 and 4.12 showed the ANOVA analysis for TIMSS grade 4 and grade 8 in 2011 and 2015 results for maths and science domains. The findings for grade 4 are statistically significant different for the maths and science at the same grade, F (2, 154) = 21.15, p= 0.000, ($p < 0.001$) and F (2, 154) = 31.85, p= 0.000, ($p < 0.001$) respectively. The findings for grade 8 results are

statistically significant different for the maths and science subjects in grade 8, F (2, 138) = 12.5, p= 0.001, (p < 0.001) and F (2, 138) = 15.77, p=0.000, (p < 0.001).

All of the above findings for TIMSS 2015 and 2011 for grades 4 and 8 in maths and science domains showed that there is a significant difference between the two rounds of the TIMSS results in the two grades for maths and science domains. This mainly correlates with the report, Dubai TIMSS 2015: Journey towards the United Arab Emirates National Agenda KHDA-2017, which explained that TIMSS is designed to measure the progress of an education system and the achievements of students in the areas of mathematics and science. Trend measures allow the gauging of the progress of Dubai's schools by comparing students at grades 4 and 8 in the 2015 cycle to those in the same grades four and eight years ago in Dubai.

As shown in Figure 5.1 below, Dubai students are performing significantly better across the board. In both grades and subjects, students on average have increased their performance by a significant amount since 2007.

Figure 5.1 The overall trends of TIMSS from 2007 to 2015



The biggest difference was observed in grade 4 science, with students in the 2015 cycle scoring more than half a standard deviation above the level of grade 4 students in 2007. The smallest difference was observed in grade 8 mathematics, but was still more than a third of a standard deviation higher than the 2007 average. The impressive results of Dubai's private schools

emphasise that the schools wasted no time to ensure achievement of the National Agenda targets. The average score of Dubai's private schools improved significantly in 2015. Some of these schools have succeeded in preparing students who performed significantly well and reached advanced levels in TIMSS, similar to students in high performing education systems. TIMSS 2015's results emphasise that Dubai's private schools have contributed significantly to the National Agenda targets and are taking the right steps in this journey. As a result, Dubai's private school scores ranked more than ten rankings higher than their 2011 rankings in grade 4 and more than seven in grade 8. The improvements that Dubai's private schools have made is affecting the UAE's scores in TIMSS. It is important to highlight that, unlike Dubai's performance in grade 8, students in grade 4 improved significantly but are still below the expectations of the UAE National Agenda. TIMSS 2015 results clearly indicate that Dubai's next target area should be primary students. Further analysis of TIMSS 2015 should focus on grade 4 in order to provide all stakeholders with data needed to understand, evaluate and improve primary students' outcomes. Similar to other international assessment findings, the results of TIMSS 2015 can initiate integrated research and analysis for evidence-based decision-making that can enhance students' achievements in mathematics and science.

Hence, all of the above discussion for findings and analysis of TIMSS 2015 and 2011 for grades 4 and 8 in maths and science domains shows that there are a significant differences between the two rounds of the TIMSS results in the two grades for math and science domains. This has answered question one regarding the significant difference between TIMSS 2015 and 2012 results.

Badri and et al (2019) explored the link between related constructs of parents, teachers, students, and student achievement in the UAE. A strong relationship was found between parental expectations and educational achievement. In general, results are congruent with many other

studies that attempted to analyse the relationship between parental involvement and the academic achievement of their children (Wilder, 2014). One significant implication of the results is that policy-makers at the government or school level in the UAE appear to be able to identify most observable components of teacher quality. Many relevant and immediate concerns could be analysed deeper. For example, teacher recruiting processes, most desired characteristics and features of teachers, type of professional developments offered, and degree and type of teacher are not communicated. In other words, policy-makers and school administrators must make recruiting, hiring, assignment, and compensation decisions based on carefully planned criteria and maybe new approaches.

TIMSS has provided a good database and source of information for describing the variations found across the country in many of the variables that have been shown to be related to student achievement. This study shows that the quality of the database stands, given the statistical fits that were observed in this study of the measurement models. It should be stressed that TIMSS 2015 questionnaires (for students and school) provide valuable information with regard to many important school, student, teacher, and other characteristic data. Performing both ANOVA and MANOVA of TIMSS scores relative to each of these features and characteristics could shed light on important differences between the different related categories of each sample. Such analysis could provide additional insights for policy-makers to better understand the nature of differences between schools and students. The resulting information could be used in developing significant initiatives and policies with regard to school education.

This is linked with the different theories discussed in section 2.3 and mainly the path dependence theory were one part of the National Agenda Policy with the TIMSS results in which schools are meeting the expectations in achieving their targets and hence the National Agenda targets.

5.3 Is there any significant difference between PISA 2011, 2015 and PBTS 2017 results?

To answer research question two, the researcher used the data analysed from the statistical analysis, quantitative independent t-test and ANOVA tests in the previous chapter.

5.3.1 Statistical analysis findings

Table 4.5 showed schools' difference between PISA 2015 and PISA 2012 for maths, science and reading domains. The findings were that (53%) of these schools showed improvements in maths domain, compare with (68%) in science domain and (60%) in reading domain, as compared between PISA 2015 and PISA 2012 results.

5.3.2 t-test findings

Tables 4.13 and 4.14 showed the t-test analysis for the results of maths in PISA 2015, which are (470.60 ± 51.36); higher than maths in PISA 2012 (465.87 ± 61.20), of 9.69 at 99.9% confidence interval, t (134) = -0.49, p = 0.63 (p > 0.001) which is not a statistically significant difference. The results for science in PISA 2015 (478.84 ± 57.66) are more than for in science PISA 2012 (471.32 ± 63.74), of 10.42 at 99.9% confidence interval, t (134) = -0.72, p = 0.47 (p > 0.001), which is not a statistically significant difference. The results for reading in PISA 2015 (475.51 ± 59.36) are higher than for reading PISA 2012 (465.46 ± 67.65), of 10.91 at 99.9% confidence interval, t (134) = -0.92, p = 0.358 (p > 0.001), which is not a statistically significant difference.

5.3.3 ANOVA test finding

Tables 4.15 and 4.16 showed the ANOVA analysis. The findings obtained were not statistically significant different for any of the two subjects, (maths, science), (maths, reading) and (science, reading): F (2, 134) = 0.24, p = 0.63 (p > 0.001), F (2, 134) = 0.52, p = 0.47 (p > 0.001) and F (2, 134) = 0.85, p = 0.36 (p > 0.001). Which means that none of the two groups showed a statistically significant difference. All of this section's findings analysis for PISA 2015 and

2012 in maths, science and reading domains shows that there are significant differences between the two rounds of the PISA results for maths, science and reading domains.

5.3.4 Statistical analysis findings

Table 4.7 showed the schools' differences between PBTS 2017 and PISA 2015 for maths, science and reading domains. The findings were that only (26%) of schools have improved their results in maths domain, (65%) improved their results in science domain, and finally (58%) improved their results in reading domain.

5.3.5 t-test findings

Tables 4.17 and 4.18 showed that t-test analysis of the results for maths in PISA PBTS (491.48 ± 67.90) are more than maths in PISA 2015 (473.06 ± 48.79), of 10.37 at 99.9% confidence interval, t (128) = -1.78, p = 0.08 (p < 0.001), which is not a statistically significant difference. The results for science in PBTS 2017 (488.68 ± 53.24) are higher than science in PISA 2015 (481.77 ± 55.07), of 9.5 at 99.9% confidence interval, t (128) = -0.73, p = 0.47 (p < 0.001), which is not a statistically significant difference. The results for reading in PBTS 2017 (481.58 ± 57.63) are higher than reading in PISA 2015 (478.88 ± 57.01), of 10.06 at 99.9% confidence interval, t (128) = -0.27, p = 0.79 (p < 0.001) which is not a statistically significant difference.

5.3.6 ANOVA test finding

Tables 4.19 and 4.20 showed the ANOVA analysis. The findings obtained for the two domains (maths, science) is F (2, 128) = 3.15, p = 0.08 (p > 0.001), for (science, reading) F (2, 128) = 0.53, p = 0.47 (p > 0.001) and for (maths, reading) F (2, 128) = 0.07, p = 0.79 (p > 0.001), which means that none of the two groups show statistically significant difference.

All of the above findings for PISA 2015 and PISA 2012 and PBTS 2017 and PISA analysis in maths, science and reading domains showed that there are no significant differences between

the two rounds of the PISA or PBTS and PISA results in either of any two domains of maths, science and reading.

The Dubai PISA 2015 report - KHDA (2018) mentioned that the PISA 2015 cycle marks Dubai's third time participating in the international assessment. Thus, Dubai have three data points, which allow us to evaluate improvement in student achievement in Dubai since 2009. In 2009, Dubai students scored an average of 466 in science; in the 2015 assessment, they scored 480, up 14 points from 2009 and six from 2012. In mathematics, Dubai students scored an average of 453 in 2009. Six years later, the average rose to 467, an increase of 14 points during the period. The greatest improvement was observed in reading, where the average score has increased by 16 points, from 459 in 2009 to 475 in 2015.

Figure 5.2 Trend in Dubai from 2009 to 2015 PISA results

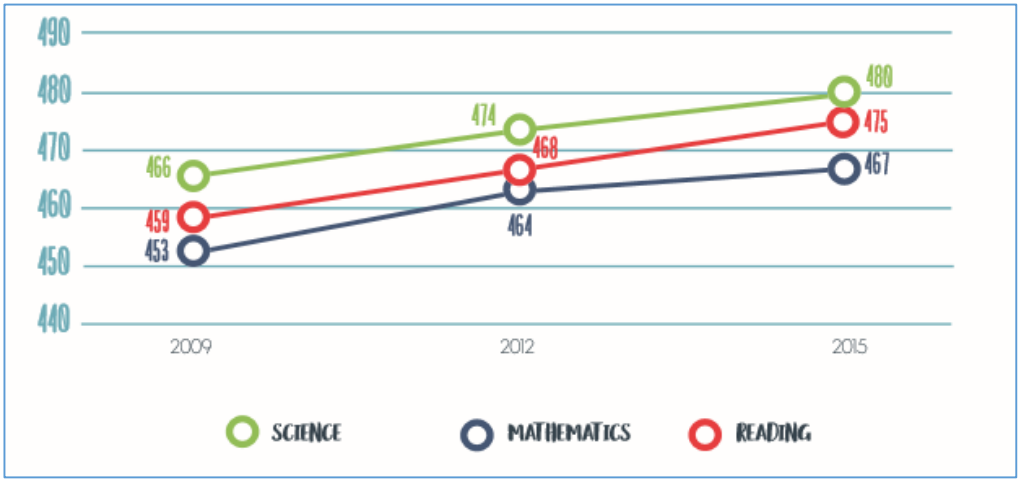


Figure 5.2 show changes in the performance of private school students in Dubai from 2012 to 2015. In keeping with the overall trend, private school students in the 2015 PISA cycle performed better across all subjects, although not to a large degree. The biggest difference was in reading, with a difference of eight points between 2012 and 2015. The smallest difference was in mathematics with a difference of only three points.

The Dubai private schools: a decade of growth key finding 2008-2018 report KHDA (2018) mentioned that for the private schools in Dubai, the PISA results average scores in science and

reading in 2011 almost placed this group alongside countries whose scores positioned them around the 20th place internationally. In 2013, schools received their individualised PISA and TIMSS reports, and in 2014, they were provided with their individual National Agenda targets for the next cycle of PISA and TIMSS. They were also required to register for the National Agenda Parameter for certain year groups. The cognitive ability test and PISA-Based Test for Schools allowed a deeper analysis of progress made by schools towards meeting their targets. During the inspections of 2015-2018, DSIB inspectors evaluated the extent to which schools had suitably modified their curricula and pedagogy to achieve their targets. In 2016-2017, only 93% of the private schools in Dubai achieved the National Agenda targets: in 2017-2018 the percentage increased to 95%.

This answers the second research question for PISA 2015 and 2012 in maths, science and reading domains, that there are no significant differences between the two rounds of the PISA 2015 and PISA 2012. It is also shows that there is no significant difference between PBTS 2017 and PISA 2015 results for maths, science and reading domains. In addition, there is no significant difference among any of the two domains, either maths and science or science and reading, or maths and reading.

Agasisti and Zoido (2019) estimated the efficiency of more than 6800 schools in 28 low-income and developing countries, using a bootstrap version of Data Envelopment Analysis as a method and PISA 2012 results. They concluded that there are relevant differences between countries in schools' average efficiency scores, if the distribution of the scores within the countries is significantly wide. Even in the countries where schools' mean efficiency is lower, there are some schools that are able to make the most of their available resources. In this sense, conducting benchmarking analyses within each country is useful, because it allows measuring the degree of internal heterogeneity in efficiency results. Therefore, international comparisons

are meaningful because they set higher targets for all schools, independently of the geographical and institutional context where they operate. In such a perspective, the international benchmarking is a great opportunity to enlarge the knowledge of practices and actions that make easier the transformation of inputs (human and financial resources) into output, i.e. students' academic achievement. Observing the characteristics of the most efficient schools (nationally and internationally) can be helpful for policy-makers to promote changes in schools' operations to be more similar to those of efficient ones. The message emerging from the second- stage is that schools in different countries have different way of being efficient, and the same holds with countries. In other words, the strategies, practices and activities that must be used to maximise the achievement levels are dependent on the specific student population that each school must serve. To the extent to which this is true, a pre-requisite for schools' efficiency is their autonomy, i.e. the possibility of experimenting different educational models, extracurricular activities, tournaments for competing with other schools, etc. This suggestion would also be coherent with the finding of some previous research, that points at suggesting autonomy as a leverage for improving students' results, and challenges the view suggested by Hanushek et al. (2013), that at low levels of economic development, increased autonomy actually appears to hurt student outcomes, in particular in decision-making areas related to academic content. In policy terms, the challenge of autonomy should be accepted as a pathway for trying in the short-medium term, to promote schools' ability to finding their way to increase efficiency. At the same time, some school-level factors appear as correlated with efficiency in the majority of countries and settings, and should be carefully evaluated by national policy-makers as possible directions towards providing incentives for schools. For instance, schools where principals consider the quality of educational resources as 'adequate' are also more efficient. In this sense, it can be the case that the quality of resources do play a role in favouring schools' actions

towards increasing achievement. Also, the indicator about the teachers-related climate is positively associated with higher efficiency scores, and this element claims for a constant attention to the quality of human resources employed in education. Lastly, schools where principals feel competitive pressures also obtain higher efficiency scores. These are several potential explanations for these results; the main resides in the incentives that the schools that are more open to the external context have for conducting their activities more efficiently. The most part of efficiency's determinates remains hitherto unexplained. On one side, it is likely that the 'technology' of schools that are more efficient in translating resources into achievements resides in teachers. Indeed, a robust finding of the literature is that teachers do make an enormous difference for students' achievement and, if considering the resources as given, more effective teachers translate into more efficient schools. This being the case, the variables that measure teachers' characteristics in PISA 2012 are still quite raw and imprecise and the necessity of improving them certainly represents a short-term challenge for PISA. Therefore, improving the details about the internal schools' practices such as governance decision-making processes, etc. would also help in clarifying potential factors associated with higher/lower levels of efficiency.

This is linked with the different theories discussed in section 2.3 and mainly the Policy learning theory were one part of the National Agenda Policy with the TIMSS results in which schools are meeting the expectations in achieving their targets and hence the National Agenda targets. While the other part of the National Agenda target is the PISA target is still one the way to be achieved although the different efforts and costs spend still this is not achieved.

5.4 What are the principals' perceptions of the implementation of the National Agenda Policy in their schools?

The main purpose of the principals' survey was to triangulate with the quantitative findings of the different test data collected and to support the findings in the qualitative inspection reports over the three academic years. This section will discuss the findings from the principals' survey questions and then triangulate the relevant parts of the survey's questions with the relevant part of the research questions, and how these support or do not support the findings in these research questions.

The survey questions were developed to cover the following sections of this research:

1- Demographic information related to each principal.

2- Principals' perceptions on the implementation of the National Agenda Policy in their schools.

3- The progress made by the private schools in Dubai towards achieving the National Agenda targets.

4- The challenges for private schools in Dubai in implementing the National Agenda Policy.

The findings of the above sections will be discussed individually:

5.4.1 Findings of the survey demographic questions

Survey questions from 1-6 which are related to the demographic information of each principal provided the following information:

- 87.5% of the participants have at least a Master's degree
- 50% are more than 47 years old in age.
- the principals of the schools participating represent a wide range of curricula
- 75% of the principals have more than six years' experience as a principal and

- 58.4% of them have experience of at least six years as principal in their current schools.

This means that 75% of the principal were in their school when the National Agenda Policy was announced in 2014 and hence have worked over the years in close cooperation with DSIB to improve their school's outcomes and to meet the school's National Agenda targets and hence achieve the National Agenda policy.

5.4.2 Findings of survey questions related to principals' perceptions of the implementation of the National Agenda Policy in their schools

The findings of questions 8, 9, 10, 14, 15, 16, 19, 20, 22, 23, 24 are related to answering research question number 4, and these findings are:

- 83.3% of the principals' surveys mentioned that their school participates in all benchmark tests.
- 71% of them mentioned that they are using the correct benchmark tests for their students; with 83.3% of them mentioning that more than 71% of their students participated in these benchmark tests
- 71% of the principals said that their school effectively promotes the awareness and understanding of the National Agenda targets among students, parents, teachers and owners; 50% of this awareness is concentrated on the parents
- 58.3% of the schools effectively modified their curriculum to be aligned to PISA, TIMSS and PBTS framework and
- 87.5% of the principals mentioned that the National Agenda targets are included in the school development plans.
- Almost an equal percentage mentioned the different four areas, lesson planning, lessons, curriculum review and development plan, where modification of the curriculum was meeting the National Agenda framework.

- 39% of the questioning styles that the teachers are implementing with students in lessons of the different subjects is to encourage critical thinking, then 35% to challenge students' different abilities.
- Almost 40% of the students are applying their learning to real life situations, according to the principals.

The findings of the above different questions relating to principals' perceptions of the implementation of the National Agenda Policy in their schools gave an example of the schools applying the National Agenda targets to their curriculum and to modifying their teaching strategies and students' learning skills by modification of the curriculum to meet the PISA, TIMSS and PBTS framework and using the different required benchmark tests.

5.4.3 Findings of survey questions related to the progress made by the private schools in Dubai towards achieving the National Agenda targets

The analysis of the questions numbered 7, 11, 12, 13, are related to the progress made by the private schools in Dubai towards achieving the National Agenda targets:

- 79.2% of the principals mentioned that their school has achieved its National Agenda targets for the year 2017-2018.
- 45.8% mentioned they have achieved the National Agenda targets in PISA, while
- 58.3% have achieved their targets in TIMSS and
- 29.2% have achieve their target in PBTS.

All of this analysis supports the answer that the schools have improved their progress towards achieving the National Agenda targets.

5.4.4 Findings of survey questions to answer the challenges for private schools in Dubai in implementing the National Agenda Policy

The analysis of questions 17 and 26 are related to answering the challenges to implement the NAP:

- 50% of the principals mentioned that resources are the main challenge and barrier to implementing the modification of the curriculum in the school to meet the National Agenda target, and
- around 25% mentioned that the teachers are the challenge for the school to implement the National Agenda Policy.
- 79.2% that it is likely that their school will achieve its National Agenda targets by 2021.

The overall finding for this section about the survey questions to answer the research question regarding whether there is any progress of private schools in Dubai towards achieving the National Agenda Parameter is that there is: (74.3%+19.7%+38.3%)/3 = 44.1% of the principals claimed that their schools have actually achieved their targets in either TIMSS 2015 or PISA 2015.

Wu H. and et al. (2019) investigated the relationships between principal's leadership and student achievement. To examine the relationship, a series of nested models was applied to PISA's US nationally representative sample. The two-level Hierarchical Linear Model (HLM) with students nested within principals/schools was used as the statistical methods to build and test proposed models. After controlling for school background variables, including school location, the estimated proportion of disadvantaged students, school size, class size, and school type, as well as student background variables of gender, age, and social economic situation (SES), this study examined the relationship between principals' leadership and student achievement. The findings showed (a) that principals' rating of their own overall leadership was statistically negatively related to student achievement, (b) that among the four subscales of principal self-rated leadership, instructional leadership was statistically positively related to student achievement, while leadership for teacher development was negatively related to

student achievement, and (c) that the principal's leadership's effect on student achievement was moderated by school contextual variables.

This is linked with the different theories discussed in section 2.3 and mainly the Institutional change theory were the school principals are representing the organisation head which are the schools and their plans to implement in their schools to achieve their National Agenda targets.

5.5 Is there any progress of private schools in Dubai towards achieving the National Agenda targets, in their yearly inspection reports for the years 2015-2016-2016-2017 and 2017-2018?

This section summarises the finding of the qualitative analysis for the National Agenda section in each school's inspections report in the three academic years 2015-2016, 2016-2017 and 2017-2018 for school's that participated in the below tests:

1- TIMSS 2011 and 2015 rounds for grade 4 and grade 8.

2- PISA 2015 and PISA 2012, and PBTS 2017 and PISA 2015 results .

5.5.1 Qualitative findings for schools reports participating in TIMSS 2011 and 2015, results for grade 4 and grade 8

Table 5.1 present the percentage of the research themes from the reports of schools that have improved in their scores for grade 4 and grade 8 TIMSS 2015 and 2011 results. These percentages were calculated from Tables 4.30 and 4.36.

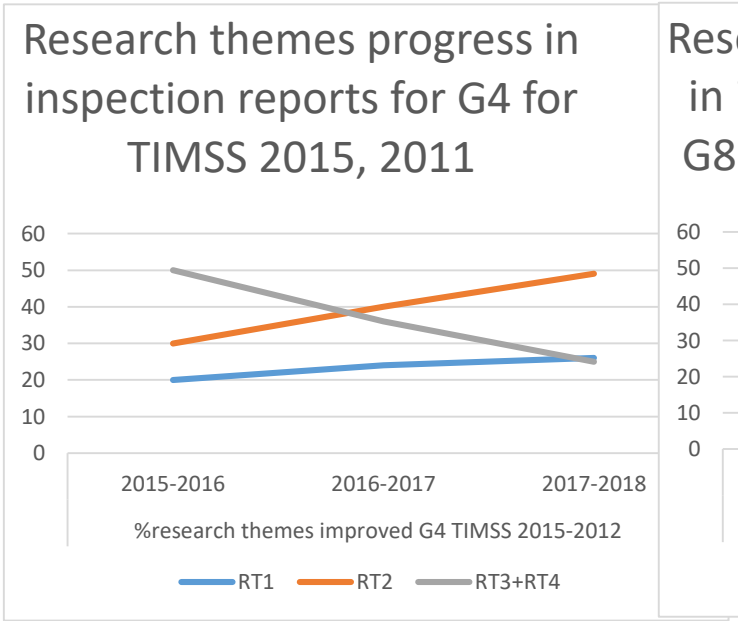
Table 5.1 Research themes for improved schools reports in TIMSS 2015 and 2011 for grade 4 and grade 8

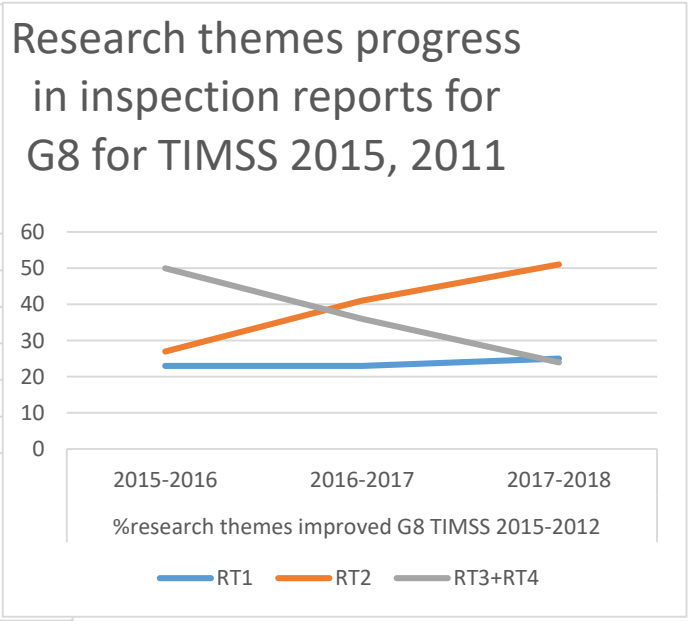
Research Themes	%Findings themes G4 TIMSS 2015 and 2011 group 2 (Improved)			%Findings themes G8 TIMSS 2015 and 2011 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions has school taken to improve and modify their curriculum? (RT1)	20	24	26	23	23	25

2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	30	40	49	27	41	51
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	50	36	25	50	36	24

Chart 5.1 (below) represents the progress of the research themes found in the inspection reports for schools that improved in their TIMSS results between 2011 and 2015 for grade 4 and grade 8 in three academic years, 2015-2016, 2016-2017 and 2017-2018, where the chart showed an improvement for the two grades in two themes, modification of the school curriculum (blue line) and the modification of the teachers' teaching strategies in their classrooms to include critical thinking, research and investigation skills (orange line).

Chart 5.1 Research themes for improved schools reports in TIMSS 2015 and 2011 for grade 4 and grade 8





5.5.2 Qualitative findings of schools, reports participating in PISA 2012 and 2015, and PBTS 2017 and PISA 2015

Table 5.2 presents the percentage of the research themes from the reports of schools that have improved in their scores between PISA 2012 and PISA 2015 and also between PBTS 2017 and PISA 2015. These percentages were calculated from Tables 4.42 and 4.50.

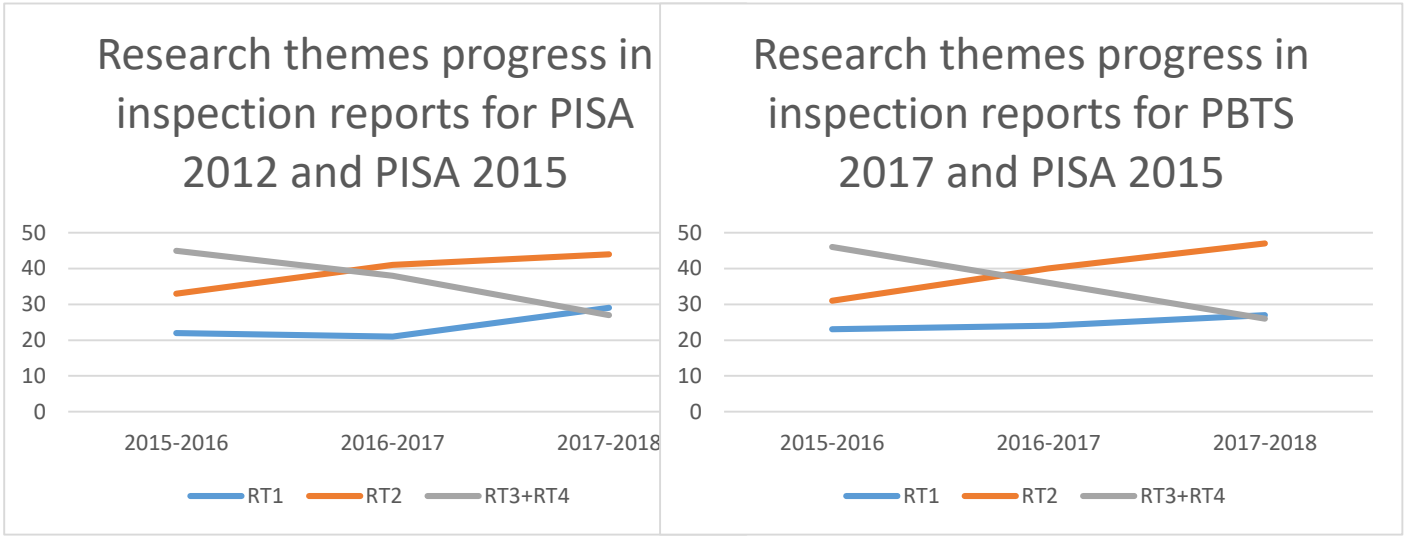
Table 5.2 Research themes for improved schools reports in PISA 2012 and PISA 2015 and PBTS 2017 and PISA 2015

Research Themes	%Findings themes PISA 2012 and PISA 2015 group 2 (Improved)			%Findings themes PBTS 2017 and PISA 2015 group 2 (Improved)		
	2015-2016	2016-2017	2017-2018	2015-2016	2016-2017	2017-2018
1-What actions have the school taken to improve and modify their curriculum? (RT1)	22	21	29	23	24	27
2-What practices are teachers, especially in maths, science and reading, using in their classrooms to include critical thinking, research and investigation skills? (RT2)	33	41	44	31	40	47
3-What are the students learning, and how are students developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data? (RT3) 4-What additional resources have the schools purchased to support the changes in teaching strategies? (RT4)	45	38	27	46	36	26

Chart 5.2 represents the progress of the research themes found in the inspection reports for schools that improved in their PISA results between 2012 and 2015 in the three academic years 2015-2016, 2016-2017 and 2017-2018, in addition to the research themes found in the inspection reports for schools that improved in their PBTS 2017 and PISA 2015, where the chart showed an improvement in two themes, modification of the school curriculum (blue line)

and the modification of the teachers teaching strategies in their classrooms to include critical thinking, research and investigation skills (orange line).

Chart 5.2 Research themes for improved schools reports in PISA 2012 and PISA 2015, and PBTS 2017 and PISA 2015



5.5.3 Discussion of findings from schools reports that improved in TIMSS, PISA and PBTS results

The inspection reports for the three academic years for schools that only improved in all of the different tests were analysed qualitatively. When correlating the research themes with the findings themes, there are only three schools that have satisfied this condition and chart 5.3 show the results for these schools' themes:

Chart 5.3 Research themes for schools reports of only 3 improved schools

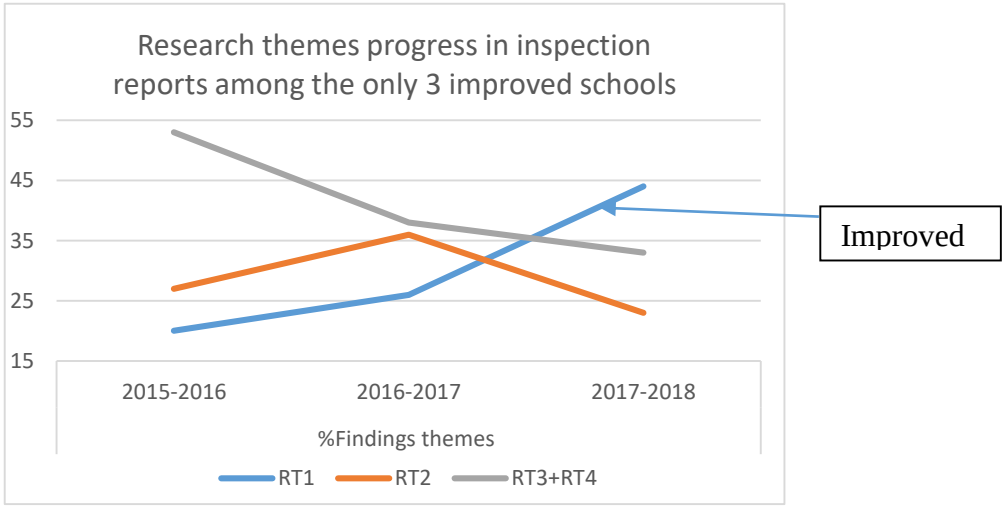


Chart 5.3 shows that schools that have improved in their overall results in the different TIMSS, PISA and PBTS have modified their curriculum (RT1) (blue) over the three academic years 2015-2016, 2016-2017 and 2017-2018; while, there was not consistent performance in the improvement of teachers in their practices to include critical thinking, research and investigation skills (RT2) (orange). The learning and improvement of resources line have shown a drop from one year to another year (RT3+RT4) indicating that there is not much difference in this theme.

5.5.4 Triangulation of inspection reports and qualitative findings with principals' perceptions findings

When triangulation was carried out with the principal's perceptions, the following was found:

- 58.3% of the schools effectively modified their curriculum to be aligned to PISA, TIMSS and PBTS frameworks, and
- 87.5% of the principals mentioned that the National Agenda targets are included in the school development plans.
- An almost equal percentage of the different four following areas: lesson planning, lessons, curriculum review and development plan were the main components to be modified in the school, in addition to the modification of the curriculum which was made to meet the National Agenda Parameter.
- 39% of the questioning styles that the teachers are implementing with their students in lessons of the different subjects is to encourage critical thinking, then 35% to challenge students' different abilities.
- 40% of the students are applying their learning to real life situations, according to the principals.

The KHDA publication 'DSIB School Inspection Key Findings 2015-2016' mentioned the following for the overall findings of National Agenda targets which started that year:

- Although there was an improved awareness of the UAE National Agenda amongst school communities, only a few schools demonstrated a good understanding of how to work towards achieving their PISA and TIMSS target scores.
- In their teaching, the majority of teachers did not apply effective strategies to develop the problem-solving and inquiry-based learning skills needed to enable students to do better in TIMSS and PISA.

The KHDA (2017) publication 'Learning from each other – Key messages 2016-2017' mentioned the following for the overall findings of National Agenda targets:

- Teachers adapted the curriculum across year groups and horizontally across subjects, to ensure better progression and inclusion of the skills required to succeed in TIMSS and PISA tests.
- Teachers used strategies that motivated students to conduct research, and provided them with the necessary resources and learning skills to do so.
- Teachers planned activities, and skilfully asked questions to elicit deeper understanding and promote critical thinking. They included open-ended problems and applications in their lessons and assessments.

Cassano and et al. (2019) found that European schools showed a progressive increase in their attention to, and interest in, the adoption of national evaluation systems and social accountability, both according to the need of enhancing educational quality and positive interaction with stakeholders. In this regard, school sustainability:

- is a condition that defines the quality of the relationships between stakeholders and schools;

- reflects the ability to duly and adequately meet educational expectations and scientific advancement of the management; and
- guarantees employment and contributes to the economic and social wellbeing of a country.

The optimisation of the productive combinations of the educational offer proposed by the school must respond to the needs of education (direct or indirect) and, in observance of suitable behaviours, to allow the activation of adequate value creation processes for the whole community. The success of the school system is therefore connected to the ability to combine the conditions of cost-effectiveness and sociality. The former is closely linked to the ability to maintain the conditions of income and monetary-financial equilibrium in compliance with the conditions of effectiveness and efficiency. The latter is linked to the implementation of stakeholders' expectations relating to the provision of the school service: to the relative evaluation and fair composition in the decision-making processes, to maximise the social function of the scholastic institutions. Therefore, this study affirms the concept of responsible and sustainable schools, aimed at the close interconnection between the principles of sound management, the fulfilment of users' social expectations, and environmental protection. The awareness of a well led and carefully monitored management, able to use effective operational evaluation and self-evaluation mechanisms, is increasingly becoming important at European level and in the national education systems. Moreover, data confirm a greater attention to evaluation issues, highlighting a substantial development of school management culture in the last three years towards the adoption of corporate governance processes. Going further, in the analysis it appears that the presence of an external evaluation system for schools went from a rate of 76% in 2015 to 98% in 2018 and for internal evaluation from 88% to 100%. The outcome shows how in-school management is raising a generalised awareness about the importance of

assuming responsible behaviour, adopting corporate governance processes based on the evaluation and, organisation of processes and actions aimed at fixing management targets, even though the development of improvement plans. It is therefore stated that a school management carefully monitored and effectively evaluated, also with different systems in different countries, is the optimal for aiming at the overall development of the school system and, consequently, improving the quality of the training of students. It is essential to direct all school processes to the development of the evaluation system: from teacher training to the quality of teaching, from the organisation of resources to the availability of more tools, from educational processes to training processes. Only if the management is oriented to stakeholders' engagement is it possible to aim at a progressive improvement of the establishment. Therefore, this study will verify the evolution in the outcomes of students in the three-year period 2015–2018. With regard to the above conclusions, the results of the research confirm the starting hypothesis of this study: the need to align the managerial skills of school governance with the changes in regulations, as well as to modify and expand the tools for assessing the school system.

This is linked with the different theories discussed in section 2.3 and mainly the Institutional change theory were the KHDA/DSIB produce the inspection reports as tools to check on the achievement of the schools to the their targets and hence to achieve the National Agenda target.

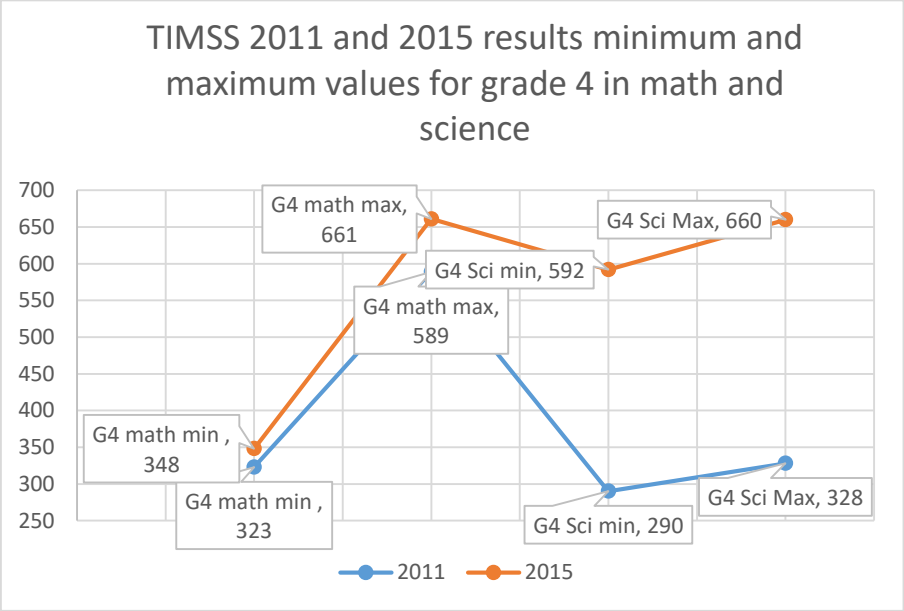
5.6 The role of the National Agenda Policy on students' achievements in TIMSS, PISA and PBTS in private schools in Dubai

This section compares the achievements of the different tests in the different rounds and links this to the National Agenda Policy.

To study the findings of TIMSS achievements for grade 4, Chart 5.4 presents the difference between TIMSS grade 4 in maths and science domains in 2011 and 2015. In grade 4 maths, the increase is between 25 points to 72 points, while in science domain it is between 32 points in the minimum value and 68 points in the maximum values. This rise can be interpreted as due

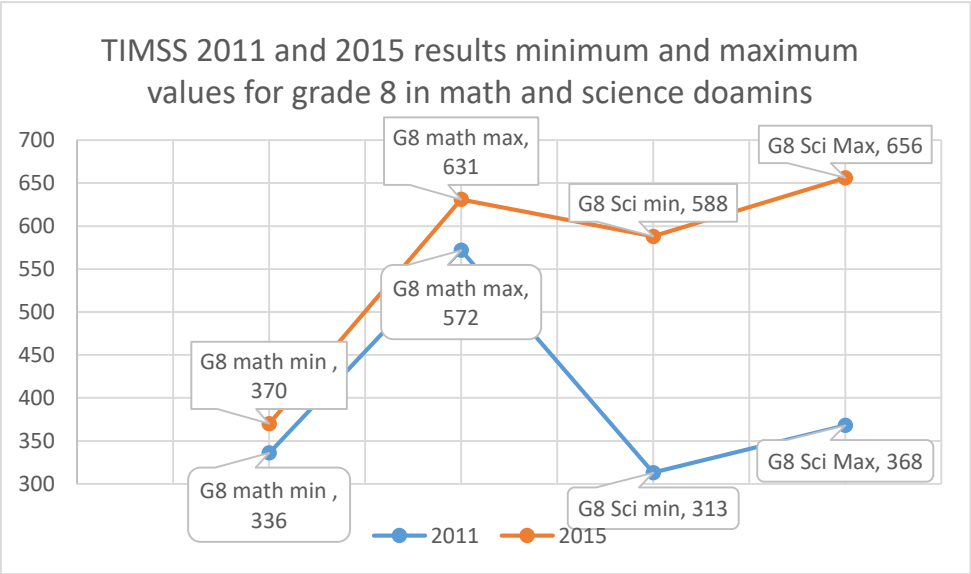
to implementation of the National Agenda in the schools participating in the TIMSS grade 4 test from 2011 to 2015.

Chart 5.4 Difference in TIMSS between 2011 and 2015 for minimum and maximum values for grade 4 maths and science domains



To study the findings of TIMSS achievements for grade 8, Chart 5.5 presents the difference between TIMSS grade 8 in maths and science domains in 2011 and 2015. In grade 8 maths, the increase is between 34 points to 59 points, while in science domain it is between 55 points in the minimum value and 68 points in the maximum values. This rise can be interpreted as due to the implementation of the National Agenda in the schools participating in the TIMSS grade 8 test from 2011 to 2015.

Chart 5.5 Difference in TIMSS achievement between 2011 and 2015 for minimum and maximum values for grade 8 maths and science domains



The KHDA (2017) publication 'Dubai TIMSS 2015: journey towards the United Arab Emirates National Agenda' mentioned that Dubai participated in TIMSS 2011 and 2015 with 49 countries that conducted the grade 4 assessments; 38 countries' participants undertook the grade 8 assessments. Similar to the previous cycles of TIMSS, across grades and subjects, students in Dubai outperformed their peers in the Middle East and North Africa (MENA) region in TIMSS 2015. Additionally, in contrast to their performance in previous cycles of TIMSS, Dubai students across each of the measures also on average performed above the international scale average of 500 on each assessment. About 68% of Dubai's students in private schools achieved the international benchmark level and above. The highest percentage of those students were in grade 8 science, at 48%.

Figure 5.3 The overall trend of TIMSS from 2007 to 2015

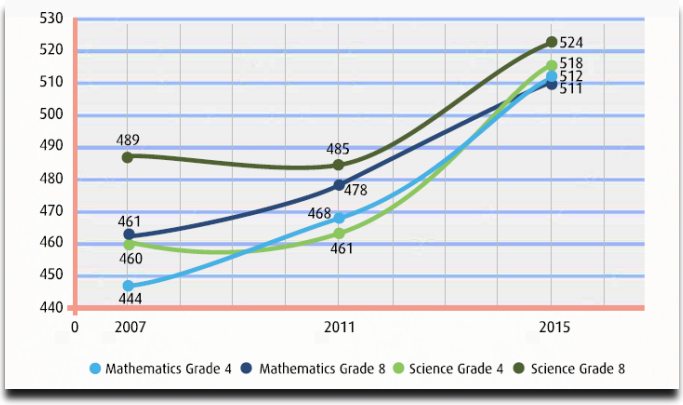
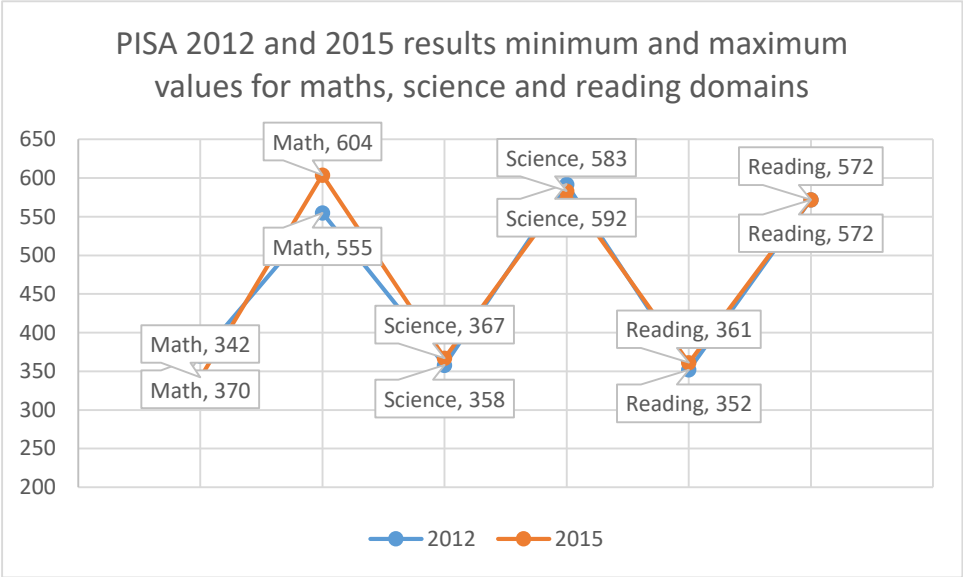


Figure 5.3 demonstrates the difference in performance of private school students in Dubai from 2007 to 2015. In keeping with the overall trend, students in the 2015 TIMSS cycle performed better across both grades and subjects. The biggest difference was again in grade 4 science between 2007 and 2015. The smallest increase was also in grade 8 science. Given that private school students make up a large majority of the students in Dubai, it would make sense that their performance mirrors the overall results described above. The performance of Dubai's private schools in TIMSS 2015 improved significantly, and as a result, Dubai has exceeded the UAE's National Agenda target for grade 8 in TIMSS.

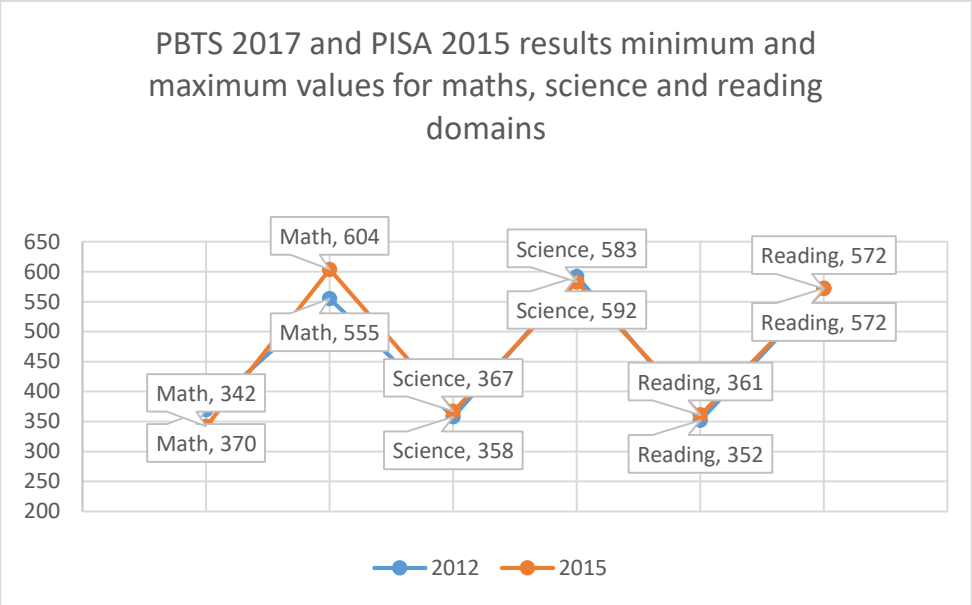
To study the findings of PISA achievements, Chart 5.6 presents the difference between PISA in maths, science and reading domains in 2012 and 2015. In maths, the change is between 43 points to a drop of -22 points, while in science domain it is between 46 point in the minimum value and 0 points in the maximum values. In reading domain it drops -3 points to a drop of -11 points between the two years. This test has little effect on the schools' improvement, which can be interpreted as because the implementation of the National Agenda was not consistent or effective enough to make improvements in the schools participating in the PISA 2012 and 2015 tests.

Chart 5.6 Difference in PISA achievement between 2012 and 2015 for minimum and maximum values in maths, science and reading domains



To study the findings of PISA achievements in relation to PBTS, Chart 5.7 presents the difference between PBTS 2017 and PISA 2015 in maths, science and reading domains. In maths, there is a drop of -28 points to an increase of 49 points, while in science domain it is between 9 point in the minimum value and -9 points in the maximum values. In reading domain it is a change of 9 points to 0 points. These results have little effect from the schools implementing National Agenda, which can be interpreted as because the implementation of the National Agenda was not consistent or effective enough to make improvements in the schools participating in the PBTS 2017 and PISA 2015 tests.

Chart 5.7 Difference in PBTS achievement between 2017 and PISA 2015 for minimum and maximum values for math, science and reading domains

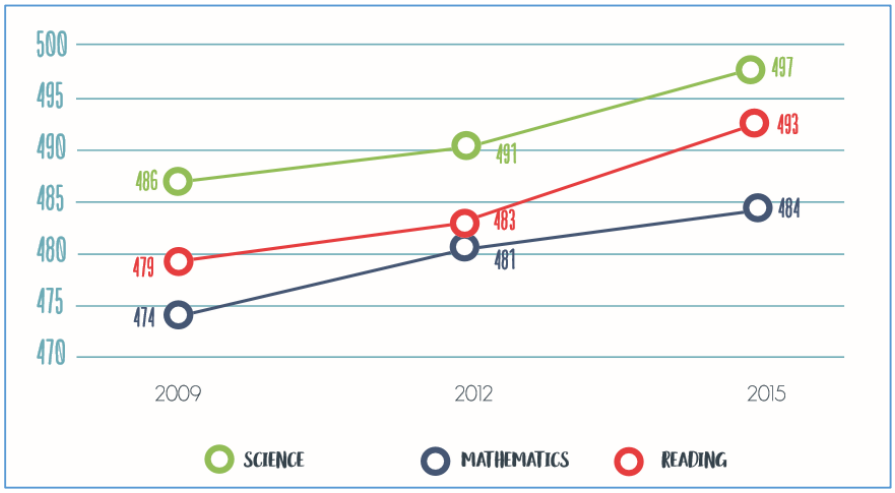


The KHDA (2018) publication 'Dubai PISA 2015' Report mentioned that results from PISA are reported using scales. Initially, the OECD average score for all three subjects was 500 with a standard deviation of 100. This means two-thirds of students across OECD countries scored between (400) and (600) points. In subsequent cycles of PISA, the OECD average score has fluctuated slightly. In PISA 2015, the OECD average was (490) in mathematics, (493) in reading, and (493) in science. Students in Dubai, private and public, were found to compare favourably to other students in the MENA region. Dubai students across each of the measures performed below the OECD average. However, students in Dubai's private schools scored at or above the OECD average in science and reading. In mathematics, they scored (484), just below the OECD average of (490). In PISA, Dubai students on average in science domain scored below the OECD average (493).

Figure 5.4 below presents the changes in the performance of private school students in Dubai from 2012 to 2015. In keeping with the overall trend, private school students in the 2015 PISA cycle performed better across all subjects, although not to a large degree. The biggest difference

was in readings with a difference of eight points between 2012 and 2015. The smallest difference was in mathematics with a difference of only three points. Given that private school students make up a large majority of the students in Dubai, it is expected that their performance mirrors the overall results described above, whereby students' performance improved but not by a large number.

Figure 5.4 Trends in achievement in PISA for private schools in Dubai



These results for TIMSS and PISA when triangulated with the principals' survey. The analysis of the survey questions 7, 11, 12, 13 is related to answering the main question of this research: is there any progress of private schools in Dubai towards achieving the National Agenda Parameter? The surveys stated that:

- 79.2% of the principals mentioned that their school has achieved its National Agenda targets for the year 2017-2018.
- 45.8% mentioned they have achieved the National Agenda targets in PISA,
- 58.3% have achieved their targets in TIMSS, and
- 29.2% have achieve their target in PBTS.

This almost agrees with previous findings in this section, where the highest difference in achievements were in TIMSS, then comes PISA and then comes PBTS.

5.7 TIMSS and PISA findings and the National Agenda Policy in Dubai

This section reflect on the findings from the above sections and to answer the research main question and its main objective, regarding TIMSS, PISA and PBTS school results, school inspection reports and principals' perception towards achieving the United Arab Emirates National Agenda Policy.

Table 5.3 presents the difference between the TIMSS 2015 results and each school's target for the TIMSS grades 4 and 8 for maths and science domains for schools that have improved in these, hence have a positive difference.

Table 5.3 The number and percentage of schools that have improved between TIMSS 2015 results and each of the school targets for grades 4 and 8 in maths and science domains

Category	(+) Positive Difference between TIMSS 2015 and each school's target results (%)
Number of schools in Grade 4 maths	47 (60%)
Number of schools in Grade 4 science	57 (73%)
Number of schools in Grade 8 maths	44 (80%)
Number of schools in Grade 8 science	48(84%)

The average percentage of the schools that achieved their targets in TIMSS grade 4 and grade 8 in maths and science domains is (60%+73%+80%+84%)/4 = 74.3%. This agrees with the principal's survey findings about the schools achieving their target for TIMSS, which was 58.3% in response to question 12. This is the highest percentage among the other tests' achievements that was mentioned by the principals in the survey.

Table 5.4 presents the difference between the PISA 2015 results and each schools' target for maths, science and reading domains for schools that have improved these differences, hence have a positive difference.

Table 5.4 The number and percentage of schools that have improved between PISA 2015 results and each of the schools' targets for maths, science and reading domains

Category	(+) Positive Difference between PISA 2015 and each school targets results (%)
Number of schools in maths	17 (25%)
Number of schools in science	10 (15%)
Number of schools in reading	13 (19%)

The average percentage of the schools that achieved their targets in PISA 2015 in maths, science and reading domains is (25%+15%+19%)/3 = 19.7%. This does not agree with the principals' survey findings about the schools achieving their target for PISA 2015, which was 45.8%, which is not the lowest percentage among the other tests' achievement. This is not as the survey percentage for PISA 2015 for question 11, which states it was the lowest.

Table 5.5 presents the difference between the PBTS 2017 results and each school's target for maths, science and reading domains for schools that have improved these differences, hence have a positive difference.

Table 5.5 The number and percentage of schools that have improved between PBTS 2017 results and each of the schools' targets for maths, science and reading domains

Category	(+) Positive Difference between PBTS 2017 and each school targets results (%)
Number of schools in maths	34 (52%)
Number of schools in science	24 (37%)
Number of schools in reading	17 (26%)

The average percentage of the schools that achieved their targets in PBTS 2017 for maths, science and reading domains is (52%+37%+26%)/3 = 38.3%. This agrees with the principals' survey findings about the schools achieving their targets for PBTS 2017, which was 29.2%, which is the lowest percentage among the other tests' achievements. As the survey answers for question 13, the percentage is the lowest for PBTS 2017 targets.

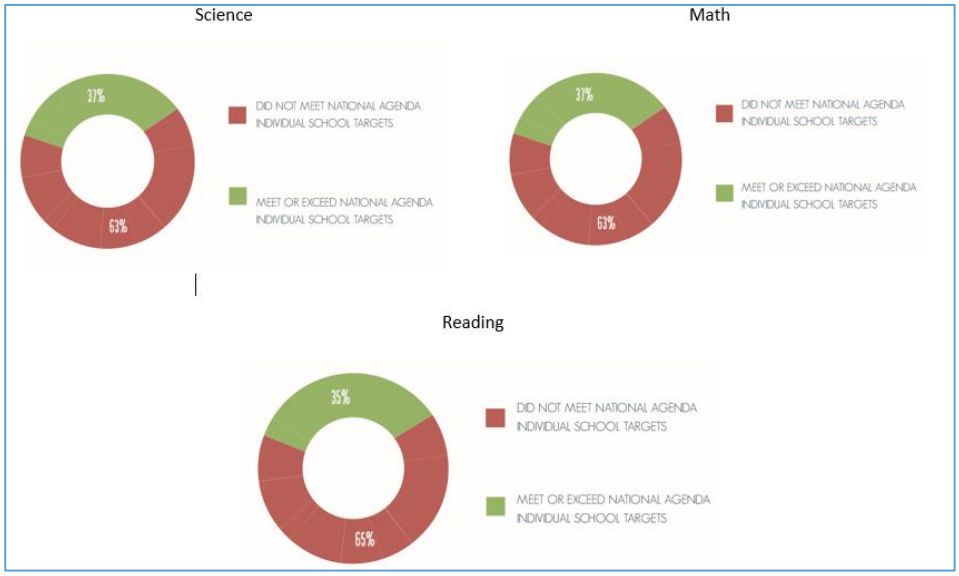
The KHDA publication 'Dubai PISA 2015' Report (2018) mentioned that in 2014, KHDA worked with schools in raising awareness about international assessments and the UAE National Agenda through the 'test4good' campaign. This campaign allowed parents and educators to experience TIMSS and PISA, and the type of questions students have to answer in international assessments. Members of the community, including government officials, had the chance to see TIMSS and PISA from a different perspective and understand their importance to the UAE's national priorities. Since 2014, KHDA has provided each school with a report on how its students performed in international assessments, how they compared internationally, and how they compared with similar schools in Dubai. The reports also provided interesting elements of the data the schools might consider using to improve the quality of provision. To assist schools in understanding their roles towards achieving the UAE National Agenda, KHDA generated a set of targets for each school, based on its performance in TIMSS and PISA. By helping schools to develop targets, KHDA emphasised that achieving the UAE National Agenda is a shared responsibility, of both KHDA and schools. In order to assist schools in achieving their individual UAE National Agenda targets, KHDA introduced in 2015-2016 the UAE National Agenda Parameter (NAPm). This initiative requires all schools to participate on an annual basis in international and external benchmarking assessments. Schools use the additional assessments to monitor their progress in meeting their individual UAE National Agenda targets.

The impressive results of Dubai in TIMSS 2015 would not have happened without the schools embracing the spirit of the UAE National Agenda and putting all efforts towards achieving their individual targets. Inspection results of 2015-2016 showed that in response to the UAE National Agenda, Dubai's private schools shared good practice, collaborated, and adopted different internal initiatives. The results also showed that the majority of the schools met the expectations

of the UAE National Agenda Parameter. This initiative, in addition to the others adopted by both KHDA and the schools, affected Dubai's performance in TIMSS 2015. This initiative ensured a National Agenda inspector on each inspection team. The inspector assessed the progress the school was making towards achieving its individual National Agenda targets. A special section dedicated to the National Agenda was included in all 2015-2016, 2016-2017 and 2017-2018 school inspection reports.

This section highlighted the school's progress towards meeting the National Agenda targets; it also provided details of internal initiatives adopted to achieve schools' targets. KHDA has followed an approach based on raising awareness, sharing good practice and responsibility. As a result, private schools in Dubai linked the country's vision and Sheikh Mohammed's aspirations to their school vision. Together, they started working towards achieving this vision. The average score of Dubai's private schools improved in 2015. This was obvious in Dubai's overall results in PISA 2015, and in the schools' individual targets. PISA 2015's results emphasise that Dubai's private schools have contributed significantly to the UAE's National Agenda targets, and are taking the right steps in this journey, as shown in Figure 5.5

Figure 5.5 The percentage of Dubai private schools who met or exceeded individual schools' National Agenda targets in science, maths and reading domains



The KHDA publication 'Dubai PISA 2015' report (2018) mentioned that Dubai's third cycle of participation in PISA is of great significance, as it allows for the monitoring of student performance during the period extending from 2009 to 2015. Overall, in the 2015 cycle, students' in Dubai performed better than their peers in other countries in the MENA region, but still below the OECD average. This was consistent with their performance in the previous two rounds of PISA. However, students in Dubai's private schools scored at or above the OECD average in science and reading, while in mathematics, they scored 484, just below the OECD average of 490. When comparing students' average scores (to those students from three or six years ago), Dubai students also improved. However, the degree to which scores improved (or declined) varied widely by curriculum and subject. There is still work to be done towards achieving Vision 2021 especially in raising the achievement of low performing schools and decreasing the differences between groups of students. In addition to the evaluation of policies which may have impacted performance, case studies and in-depth analysis of factors that impacted on specific schools' progress would be very useful as DSIB work towards increasing achievement for all of Dubai's students.

The KHDA publication ‘Dubai TIMSS 2015: journey towards the United Arab Emirates National Agenda’ (2017) mentioned that TIMSS 2015 marked Dubai’s third cycle of participation: another opportunity to evaluate students in Dubai in terms of their progress both in comparison to their international peers and to grade 4 and grade 8 students in Dubai who participated in past cycles of TIMSS. TIMSS 2015 also marked the first cycle for measuring Dubai’s achievements against the UAE’s National Agenda targets. The performance of Dubai’s private schools in TIMSS 2015 has improved significantly, and as a result, Dubai has exceeded the UAE’s National Agenda target for Grade 8 in TIMSS. The impressive results of Dubai in TIMSS 2015 would not have happened without the schools embracing the spirit of the UAE National Agenda and putting all efforts towards achieving their individual targets. Inspection results of 2015-2016 showed that in response to the UAE National Agenda, Dubai’s private schools shared good practice, collaborated and adopted different internal initiatives. The results also showed that the majority of the schools met the expectations of the UAE National Agenda Parameter. This initiative, in addition to the others adopted by both KHDA and the schools, affected Dubai’s performance in TIMSS 2015. It is important to highlight that unlike Dubai’s performance in grade 8, students in grade 4 improved significantly but are still below the expectations of the UAE National Agenda. TIMSS 2015 results clearly indicate that Dubai’s next target area should be primary students. Further analysis of TIMSS 2015 should focus on grade 4 in order to provide all stakeholders with the data needed to understand, evaluate and improve primary students’ outcomes. Similar to other international assessment findings, the results of TIMSS 2015 can initiate integrated research and

analysis for evidence-based decision-making that can enhance students' achievements in mathematics and science.

5.8 The challenges of private schools in Dubai in implementing the National Agenda Policy

Applying the National Agenda Policy in private schools in Dubai had created different challenges for the schools to work on the implementation. This research uses the qualitative findings of the inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018 as the main tool of evidence that can express these challenges. These findings were triangulated with the principals' survey responses, in addition to the yearly publications reports of DSIB/KHDA about the National Agenda targets.

From the previous findings the main challenges of schools to implement the National Agenda policy were the following:

1- The ability of the teachers to modify their teaching practices especially in maths, science and reading to use critical thinking, research and investigation skills in their teaching.
2- The availability of the additional resources the schools have to purchase in order to support their teachers' teaching strategies.
3- The students learning, and how students are developing their skills to manage their own learning, use of information and communication technology (ICT) to research, analyse and evaluate data to support their learning.

This was observed in the dropping percentages of the above elements in the inspection reports' findings over the three academic years. These are triangulated with the principal's survey and the finding whereas follows:

- 50% of the school principals' responses mentioned that resources are a challenge and a barrier to implement a modified curriculum for the school to meet the National Agenda targets.
- 39% of the questioning styles that the teachers use in lessons are to encourage critical thinking.
- 32% is to challenge students' different abilities, and
- 39% of students demonstrate learning skills that are applicable to real life situations, and
- 18% of students can communicate their learning.

The KHDA publication 'DSIB School Inspection Key Findings 2015-2016' (2016) mentioned that the quality of assessment in Dubai schools has substantially improved over the past eight years of inspections. Fifty-six percent of schools now have a 'good' or better assessment, compared to 24% in 2008-2009. For the year 2015-2016 an increasing number of schools have aligned their internal assessments with their curriculum standards. At the same time, DSIB inspection findings have indicated that some schools have been more successful than others in their efforts to meet National Agenda targets. These schools have been using external benchmarking examinations in addition to TIMSS and PISA to ensure they have reliable, regular assessment information against which they can benchmark their students' academic outcomes. By the 2016-2017 academic year, it is expected that all private schools in Dubai will have access to valid, objective and reliable measures of their students' attainment and progress in mathematics, reading and science. This information, together with data from the PISA and TIMSS tests, and inspection reports, should give a clear indication of the progress schools are making towards meeting their National Agenda targets. It should also help schools identify their strengths and weaknesses and priorities for improvement. For the 2015-2016 year, inspectors

have focused on five indicators that, when considered together, provide an indication of the degree of readiness of each school to meet its National Agenda targets. These indicators are:

1. Students' attainment in mathematics, English and science, based on external benchmark assessments.
2. Awareness and understanding of the National Agenda Parameter by the school community.
3. Adaptation of the curriculum to include content and skills that underpin the PISA and TIMSS tests.
4. Learning skills, with a focus on students' research skills and use of learning technologies.
5. Teaching strategies, especially the promotion of students' critical thinking.

The KHDA publication 'Learning from each other – Key messages 2016-2017' (2017) mentioned that for schools to achieve the National Agenda targets they need to focus on the following:

1- Students' attainment in English, maths and science.
2- Quality and use of data analysis of international benchmark assessments to improve curriculum, teaching and learning.
3- Curriculum adaptations to meet TIMSS and PISA requirements.
4- Adjustment of teaching methods to develop students' critical thinking and research skills.

The KHDA publication 'PISA 2015 report' (2018) mentioned that there is still work to be done towards achieving Vision 2021 especially in raising the achievement of low performing schools and decreasing the differences between groups of students. In addition to the evaluation of policies which may have impacted performance, case studies and in-depth analysis of factors

that impacted on specific schools' progress would be very useful as schools work towards increasing achievement for all of Dubai's students.

Johansson and Hansen (2019) mentioned that there have been major curriculum movements in many countries, for example, Singapore, Hong Kong, Korea and Taiwan regarding coverage patterns. Though, it is likely that some countries follow TIMSS in their revisions of curricula. Consequently, certain countries might be likely to 'teach to the test' to a higher degree than others. PISA is likely to exert an influence on countries' curricula; it encompasses a somewhat different set of countries and ways of testing knowledge and skills. Finally, curricular developments as a consequence of the impact of large-scale international assessments are not easy to establish. While international studies may have a large impact on educational debates and policy discussions in different countries, such effects are difficult to prove. Rather, the analyses of the current study of Johansson and Hansen may provide insights into curricular developments within the countries that participated in TIMSS Grade 8. Consequently, the reasons why certain developments took place need to be further established. Combining a quantitative approach with more in-depth within-country analyses, could provide a fruitful direction for future research. For example, the study might benefit from validating the findings in relation to general global and national trends in mathematics education. Such validation could, for instance, be based on the information provided in the TIMSS Encyclopedias, and via further analyses of documents on the national curricula.

5.9 Chapter summary

This chapter interpreted the data for this research's four questions and gave a detailed discussion for the findings pertaining to each question. The different data collected were triangulated to give strong evidence of the research question findings. The relation between the achievement of these schools in TIMSS and PISA and the relation with the National Agenda was explained.

The effect of National Agenda Policy on the schools' performance in these tests was discussed, and finally the research's main question and the main aim about the progress of private schools in Dubai towards achieving the National Agenda Policy in TIMSS and PISA results was discussed. The challenges for private schools in Dubai to implement the National Agenda Policy was discussed at the end of this chapter.

CHAPTER 6: Conclusion and Recommendations

6.1 Introduction

This chapter, gives the conclusion of the research findings relating to the progress of private schools in Dubai (UAE) towards achieving National Agenda targets in TIMSS and PISA. The chapter includes the main findings, the theoretical implications, the recommendations of this research, and its contribution to the body of knowledge and the literature, along with the research limitations and what would be the future steps for such research.

6.2 Summary of the research

The research answered the four research questions as follows:

1- There are significant difference between the two rounds of the TIMSS 2015 and 2011 results for grade 4 and 8 in maths and science domains.

2- There is no statistically significant difference between PISA 2015 and PISA 2012. In addition, there is no statistical difference among any of the two domains either maths and science, or science and reading, or maths and reading domains.

3- There is no significance difference between PBTS 2017 and PISA 2015 results for maths, science and reading domains. In addition, there is no significant difference among any of the two domains, either maths and science or science and reading, or maths and reading.

4- The principals' survey responses were triangulated with most of the different research questions; they supported the view of the principals and answered most of the research questions.

5- The analysis of the inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018 showed that schools have improved mainly when they have modified their curriculum to meet the required PISA and TIMSS frameworks; in

addition, it showed the need to change the teachers' teaching strategies to include encouraging students to think critically, using research and problem-solving skills.

According to the best of the researcher's knowledge, this research was one of its kind in Dubai and the UAE. It studied the progress of private schools in Dubai towards achieving the National Agenda target through participation in TIMSS and PISA tests, in addition to comparing inspection reports for the three academic years 2015-2016, 2016-2017 and 2017-2018, and also eliciting the school principals' perceptions. A mixed method approach was used to analyse the results of these tests quantitatively, with concurrent triangulation with the yearly inspection reports of these schools over the academic years 2015-2016, 2016-2017 and 2017-2018. These reports were analysed qualitatively and then the findings were supported by the analysis of the principals' perceptions on the implementation of the National Agenda in their schools.

The findings of this research show that private schools in Dubai made progress towards their National Agenda targets from 2014, when the National Agenda Policy was announced, until the year this research was approved. Although, this progress is not the same for all private schools and not the same for all the different tests and grades or test domains. Schools with TIMSS 2015 results for grades 4 and 8 showed more improvements in achieving the National Agenda targets, especially for grade 4 science domain, in comparison to grade 8 for maths and science domains. Hence, with these results of TIMSS for private schools, Dubai will achieve the National Agenda target, which is to be in the top 15 places internationally by the year 2021. PISA results, on the other hand, over the years and in the year 2015 did not show any significant difference from the 2012 results in the three domains of maths, science and reading. The progress of Dubai's private schools in this test is much slower than for the TIMSS results. So the possibility of Dubai and UAE to achieve their desire to be in the top 20 places in PISA internationally by the year 2021 is now questionable.

6.3 Other research findings

The other findings in this research are as follows:

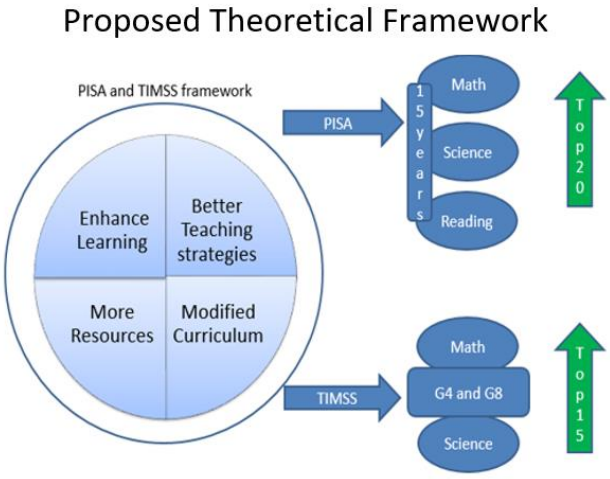
- Modification of the curriculum and teachers' strategies to teach students problem-solving, research and critical thinking is better in lower grades in comparison with other grades especially the higher grades.
- Principals' perceptions 75% of their responses showed that they had been in their school when the National Agenda Policy was announced in 2014 and hence they have worked over the years in close cooperation with DSIB to improve their school's outcomes and to meet the school's National Agenda targets and hence achieve the National Agenda Policy.
- The inspection results for 2015-2016 showed that in response to the UAE National Agenda, Dubai's private schools shared good practice, collaborated and adopted different internal initiatives. The results also showed that the majority of the schools met the expectations of the UAE National Agenda Parameter. This initiative, in addition to the others adopted by both KHDA and the schools, affected Dubai's performance in TIMSS 2015.
- The schools applying the National Agenda parameter need to change their curriculum and to modify their teaching strategies and students' learning skills to meet the PISA, TIMSS and PBTS frameworks.
- Schools should be using the different required benchmark tests to support measuring their progress towards the National Agenda targets; however, 44% of private schools in Dubai have actually achieved their targets in either TIMSS 2015 or PISA 2015.

6.4 Theoretical Implication

The findings in this research were correlated with the theoretical framework applied and found to correlate with the institutional change theory, where institutions adopt formalised rules that may be enforced by a third party. In the case of the Dubai, it is the country which has formalised the rules for the National Agenda Policy that were required by the new globalisation theory and which were enforced in Dubai private schools by the KHDA/DSIB. The type of institutional change theory for this research will match the redirected theory type, in which, this research represents the country's vision for education that was redirected towards achieving a place in the top 20 highest countries in PISA and the top 15 in TIMSS by 2021 (UAE Vision, 2010). This was asking the schools to adapt new goals, functions and purposes into their internal policies, practices, and into their curricula to meet the required TIMSS and PISA frameworks. UAE has issued the National Agenda Policy to be checked by the National Agenda Parameter to measure the schools' performance in TIMSS, PISA and PBTS and to monitor the progress of the private schools in Dubai towards achieving the National Agenda targets by 2021.

The findings were correlated with the conceptual framework that was proposed in Figure 2.4, in which the researcher proposed to merge Dale's 2000 theory of globalisation 'Global Structured Agenda for Education' (GSAE) with the TIMSS and PISA frameworks.

Figure 2.4 Consistent schools' practices of the TIMSS and PISA framework will lead to consistent outcomes



In this model, the change in the results of international tests such as PISA and TIMSS will depend on the school's practices, which are affected by one or more of the four different components, which are: teaching strategies, curriculum modifications, students' learning and school resources. These components are the main elements that the PISA and TIMSS framework is based on. Figure 2.4 shows how the work of the schools based on this model can affect the school and students' outcomes, where consistent practices could be implemented over all the different components to make the required progress. Blatti (2009) mentioned, implementing good practices in all areas of the curriculum, to purchase resources and be aware of the school's resource development, in addition to providing professional development for staff and parents as the need arises. This will lead to the continuous development of the curriculum, and coordinating documentation for all levels of the curriculum will help in achieving the aimed-for goals.

6.5 The research recommendation

Based on these findings, the researcher has formulated a set of recommendations to ensure the effective achievement of the National Agenda and for the schools to implement to achieve the National Agenda targets by 2021.

The KHDA publication 'DSIB School Inspection Key Findings 2015-2016' (2016) mentioned that it required all private schools to participate in international tests. Some schools are in a better state of readiness to meet their targets, as can be seen from the principals' survey question in which 77% of the school principals assured that it is likely for their school to achieve its National Agenda targets by 2021.

The main recommendations are:

1- TIMSS 2015 results clearly indicate that Dubai's next target area should be primary students. Further analysis of TIMSS 2015 should focus on grade 4 in order to provide all stakeholders with the data needed to understand, evaluate and improve primary students' outcomes. In addition to this more analysis of the results of PISA in the different domains will provide the different authorities with the areas they need to modify in order to achieve better results.

2- Curriculum modification is the main aspect for changing schools' performance in test exams; the implementation of new strategies for teaching including the use of critical questioning, research and investigation skills, in addition to the enhancement of resources in school will also support the schools to achieve better results in TIMSS, PISA and PBTS tests. Hence, all schools should continue adding this to their curriculum modification to achieve better results.

3- Private schools in Dubai need to adapt to work towards meeting the National Agenda targets: to study the necessary skills required for PISA assessment and modify the

curriculum across the different grades and in different subjects, especially in maths, science and reading to meet the needed skills.

4- School leaders should use external curriculum benchmark tests other than TIMSS, PISA and PBTS for all grades starting grade 3 up to grade 10 in different main subjects such as maths, science and English, and hence, to measure students' progress from one year to another. These tests would help the schools to compare their outcomes with other international students.

5- School leaders should use the outcomes of the external curriculum benchmark tests to inform their teacher training plans and to evaluate teaching and learning.

6- School leaders should work with all levels of stakeholder in the school and give them the needed support, and to form committees that work on the monitoring and implementation of the National Agenda strategies in the school.

7- School leaders should form committees in each of the main subjects to work on modification of the curriculum to meet the TIMSS and PISA frameworks across all school grades.

8- School leaders should train all of the main subjects' teachers on how to use problem-solving, critical thinking and research in their lessons, after the modification of their curricula.

9- School leaders must make sure that students in lessons and around the schools are learning how to search for information, and think critically and creatively in solving problems in solving problems, in addition to applying this learning to real life problems.

10- School leaders have to make sure that all the needed resources are available for students in the school and for the teachers to use in their lessons for teaching and learning.

11- Private schools were required to register for the National Agenda Parameter for certain year groups. The cognitive ability test and PISA-Based Test for Schools, which the schools were oblige to implement allowed a deeper analysis of progress made by schools towards meeting their targets.

6.6 Limitations

There are many limitations related to this research:

1- The sample of private schools selected for the quantitative analysis for each of the different tests, depended on whether the inspection reports for the participating schools over the three academic years 2015-2016, 2016-2017 and 2017-2018 have been published on the KHDA website, which means that the number of sample schools could be increased if these reports were published on the website.

2- The number of school principals who participated by responding to the survey was not high as it was only 25% participation, but this is an issue with all private schools. Although the researcher tried to send the survey twice to the schools' principals, still the percentage was low.

3- National and regional literature related to this topic was scarce; nothing could be found that has been worked on similar way to this study. This is why the research depended highly on the KHDA/DSIB publication to correlate the findings of this research.

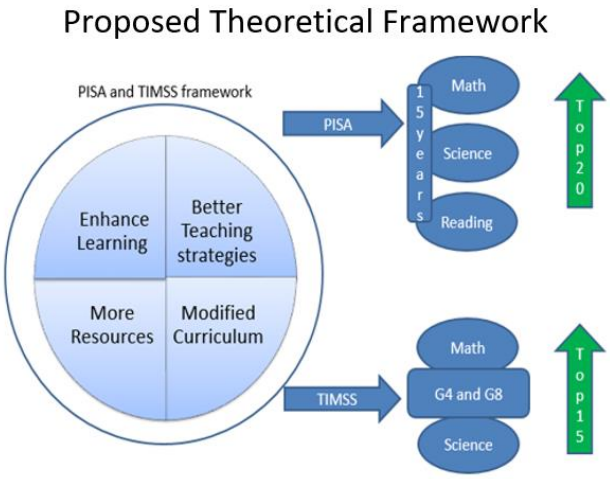
6.7 This research's contribution to knowledge

This research had the following contributions to the educational research, mainly in the UAE. This research could add little to the overall knowledge but the conceptual approach suggested could be the importance of linking global theories to national educational policy to ensure change or reform to happens. The following contributions are related to the proposed conceptual framework, qualitative data analysis, and research findings:

6.7.1 Conceptual framework

The research proposed to merge Dale's 2000 theory of globalisation 'Global Structured Agenda for Education' (GSAE) with the TIMSS and PISA frameworks, where the suggested model was presented on Figure 2.4.

Figure 2.4 Consistent schools' practices of the TIMSS and PISA framework will lead to consistent outcomes



In this model, the change in the international tests such as PISA and TIMSS results will depend on the school's practices, which are affected by one or more of the four different components: teaching strategies, curriculum modifications, students' learning and school resources. These components are the main elements that the PISA and TIMSS framework is based on. Figure 2.4 shows, how the work of the schools based on this model can affect the school and students' outcomes, where consistent practices should be implemented over all the different components to make the required progress.

6.7.2 Qualitative Data analysis

Extensive data analysis was performed in this research including the PISA, TIMSS and PBTS in two rounds of quantitative tests, and the school inspection reports for three academic years for each school that participated in any of the three different tests, which included quantitative and qualitative analysis. There was also quantitative analysis of the principals' survey results.

In the qualitative analysis of the schools' inspection reports, a number of thematic words appearing in text were-linked to a thematic findings, and percentages of these thematic findings that were found in a certain text. Finally, these thematic findings were correlated with one of the research themes. Appendix 4 tables present these numbers and percentages for all tests across the three academic years 2015-2016, 2016-2017 and 2017-2018.

6.7.3 Publications

The different questions of this research and the answers he proposed, and the triangulation, have produced an extensive amount of data and information, which can benefit the decision- makers in the country by giving them the evidence and information to change or modify any educational policies.

The researcher, during his journey in studying for a PhD in this university managed to participate in publishing one article and another article is to be published soon; these two articles have the same concept as this research:

- The first article was 'Did the National Agenda Policy in Education in the UAE affected PISA results of private schools in Dubai between 2012 and 2015' and it was published as a scholar's press with the reference: 'Bdeir R., (2018). Did the National Agenda Policy in Education in the UAE affected PISA results of private schools in Dubai between 2012 and 2015. (pp.167-178). In David, S.A., & Abdulai, A. (2018). Eds., Education Policies in the Age of Social Advancement: Studies from the United Arab Emirates. Scholars' Press'.
- The second article, yet to be published, is 'Best practices of private schools in Dubai in modification of their curriculum to meet UAE's National Agenda targets.'

6.8 Further research

This research paper has several implications for future research in the field of education and of Dubai achieving the National Agenda targets, such as:

- There is still work to be done towards achieving Vision 2021 especially in raising the achievement of low-performing schools and decreasing the differences between groups of students. In addition to the evaluation of policies which may have impacted performance, case studies and in-depth analysis of factors that impacted on specific schools' progress would be very useful as DSIB work towards increasing achievement for all of Dubai's students.
- Ensure the practices of the private schools in Dubai are replicated in the public schools in Dubai and the UAE, mainly through the modification of the curriculum to adopt the PISA, TIMSS framework. In addition, to changing the teachers' practices and encouraging students to adopt critical thinking, research and problem-solving skills.
- Continue in this study to analyse the tests of PISA 2018 and of TIMSS 2019, and to correlate with the school inspection reports for the academic years 2018-2019 and 2019-2020 to analyse any improvement of these schools towards meeting the National Agenda targets.

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Appendices

Appendix 1 Principal's Survey

Principal Survey

* Required

Progress of Private schools in Dubai towards achieving National Agenda Policy Challenges and lessons learned: evidence from TIMSS, PISA and PISA Based Test for Schools

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Dear Respected Principal
My name is Raed Bdeir and I am a student at the British University in Dubai working on my doctorate degree. I am conducting a research study entitled "Progress of Private schools in Dubai towards achieving National Agenda Policy Challenges and lessons learned: evidence from TIMSS, PISA and PISA Based Test for Schools (PBTS)". One of the purposes of the study is to investigate the perceptions of private school Principals in Dubai about their work to achieve the National Agenda targets by 2021.

Thank you very much for agreeing to take part in this survey. The survey should take around 10-15 minutes to complete.
All information received will be treated anonymously and with utmost confidence, and subsequently transferred to electronic password protected documentation. At the conclusion of the study, the original data will be destroyed. Neither your name, your present institution or any other distinguishing factor will be identifiable or referred to.
Participation in the study is voluntary. You may discontinue your participation in this research at any time. If you have any questions about the study, Please direct them to 2015121128@student.buid.ac.ae or call 00971509027893 or Dr Abdulai Abukari abdulai.abukari@buid.ac.ae or call 0097142791400 Ext: 467.
.
You also have a right to be informed of the results of the study and to be alerted of final publications: if this would be of interest to you then please add your email address below.

Thank you again, your time and participation is much appreciated.

Raed Bdeir

October 2018

1. Demographic information:

---

1. **Gender** *
   Mark only one oval.

- Male
- Female

2. **Highest Education Degree** *
Mark only one oval.

- Bachelor's degree
- Master's degree
- Doctorate degree

3 **Age** *
Mark only one oval.

- 25-35 years
- 36-46 years
- 47-57 years
- 58 and above years

4. **Number of years as a Principal** * *Mark only one oval.*

- Less than one year
- 1 year
- 2-5 years
- 6-9 years
- 10 years or above

5. **Number of years as a Principal in the current school** *
Mark only one oval.

- Less than one year
- 1 year
- 2-5 years
- 6-9 years
- 10 years or above

6. **Which curriculum does your school use? (If your school offers more than one curriculum, please select accordingly).** *Mark only one oval per row.*

	UK	US	MoE	IB	Indian	Other (not listed)
Choice 1						
Choice 2						
Choice 3						

2. Survey questions:

As a Principal, please provide your opinion on each of the following questions regarding, the National Agenda measures and actions that the school took to achieve National Agenda targets?

7. **Has the school achieved its National Agenda targets for the last academic year 2017-2018** * *Mark only one oval.*

- ◯ Yes
- ◯ No

8 **Has the school participated in all the benchmark tests?** *
Mark only one oval.

- ◯ Yes
- ◯ Partially
- ◯ No

9. **Were the curriculum benchmark tests used aligned to your curriculum?** * *Mark only one oval.*

- ◯ Yes
- ◯ Partially
- ◯ No

10. **What was the percentage of students who have participated in the school benchmark tests in the last academic year 2017-2018?** * *Mark only one oval.*

- ◯ 50%-70%
- ◯ 71%-90%
- ◯ Above 91%

11. **Did the school meet its National Agenda targets in PISA 2015 test? (If applicable)** *
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not Applicable

12. **Did the school meet its National Agenda targets in TIMSS 2015 test? (If applicable)** *
Mark only one oval.

- ◯ Yes
- ◯ No
- ◯ Not Applicable

13. **Did the school meet its National Agenda targets in PBTS in 2017 test? (if applicable)** *
Mark only one oval.

- Yes
- No
- Not Applicable

14 **Do you think that the school effectively promotes the awareness and understanding of the National Agenda targets among students, parents, teachers and owners?** *
Mark only one oval.

- Yes
- Partially
- No

15. **Which of the different school stakeholders do you think are not effectively aware of the school's National Agenda targets? (Select only two of the most important ones)** *
Mark only one oval per row.

	Students	Parents	Teachers	Owner
Choice 1				
Choice 2				

16. **Has the school effectively modified its curriculum to be aligned to PISA, TIMSS and PBTS framework?** * *Mark only one oval.*

- Fully
- Partially
- No

17. **What would be the challenges and barriers of implementing a modified curriculum for the school to meet the National Agenda targets? (select only two of the most important ones)** *Mark only one oval per row.*

	Governors	Leadership team	Teachers	Students	Resources
Choice 1					
Choice 2					

18. **Any others not mentioned above:**

_____

19. **Are the National Agenda targets included in the school developmental plans?** * *Mark only one oval.*

- Yes fully
- Yes partially
- No

20 **Where can you observe the modification of the curriculum to meet the National Agenda framework? (Optional you may chose more than one answer)** *Mark only one oval per row.*

	Lesson planning	Lessons	Curriculum review	Developmental plans
Choice 1				
Choice 2				
Choice 3				
Choice 4				

21. **Any others not mentioned above:**

_____

22. **Are the National Agenda targets included in the departmental development plans?** * *Mark only one oval.*

- Yes fully
- Yes partially
- No

23. **What questioning styles are your teachers implementing with your students in lessons of the different subjects? (Please choose only the most two styles used)** * *Mark only one oval per row.*

	Close short questions	Open questions	Challenge student's different abilities	Encourage critical thinking
Choice 1				
Choice 2				

24. **What learning skills do your students demonstrate when they are in lessons? (Select only the most two important skills)** *Mark only one oval per row.*

	Communicating their ideas	Acting as motivated and for confidant learners	Applying their learning to real life situations	Showing responsibility their learning
Choice 1				
Choice 2				

25. **Any others not mentioned above:**

_____

26. **Is your school likely to achieve its National Agenda targets by 2021?** * *Mark only one oval.*

- Yes
- Partially
- No

27 *Mark only one oval per row.*

	Prof	Dr.	Mr.	Mrs.	Ms.	Miss
Title						

28. **Email address (Optional)**

Appendix 2 Research Ethics form

الجامعة البريطانية في دبي
The British University in Dubai

Research Ethics Form (Medium / High Risk Research)

To be completed by the researcher and submitted to Research Ethics Committee

i. Applicants/Researcher's information:

Name of Researcher /student	Raed Bdeir
Contact telephone No.	0509027893
Email address	2015121128@student.buid.ac.ae
Date	2/8/2018 V3 22/11/2018

ii. Summary of Proposed Research:

Background and rationale for study (This should be sufficient to justify the proposed research). Aims and objectives of the research (or the research question/s) and Potential benefits of proposed research: Limit to 500 words
In 2014 His Highness Sheikh Mohammed Bin Rashid Al Maktoum, Vice-President and Prime Minster of UAE, and Ruler of Dubai, launched the UAE National Agenda. It included eight objectives that should lead the UAE to be among the most successful countries in providing a world-class education. In addition, to provide schools with concrete targets against which they can measure their progress towards achieving the UAE Vision 2021 through international assessments. UAE aims to achieve in 2021 the highest 20th country in PISA and to be the highest 15th country in TIMSS, which could impose a big demand on the schools outcomes. A country that have recently liberated in 1971 with an educational system that has just started to improve. This research will investigate the progress of private schools in Dubai towards achieving the National Agenda Parameter (NAP) through studying of TIMSS 2011 and 2015 results and PISA 2012 and 2015 in addition to PBTS 2017 results. National Agenda Parameter is an indicator for measuring and monitoring schools' progress towards achieving their individual National Agenda targets. DSIB inspect and report on each school plan towards achieving the NAP yearly in their schools inspection reports since the announcement of the National Agenda Policy 2014. In addition to analysis of each schools international tests results, this research will study schools plans in three years 2015-2016, 2016-2017 and 2017-2018, to cover the period from the beginning of the implementation of the National Agenda until the announcement of the latest PISA, TIMSS 2015 and PBTS results in 2017. This parameter NAP will

concentrate on identifying progress that schools have made on, modifying curriculum, developing teaching strategies, and enhancing students learning skills and providing more resources to meet these targets. The perceptions of principals of the selected schools will be collected and analyzed to investigate; what are the different practices they have implemented in their schools; in relation to teaching strategies, curriculum modification, enhancing students learning skills and to support their schools with additional resources to achieve better results in TIMSS or PISA and PBTS.

Questions

This study will attempt to answer the following questions:

- What is the role of the National Agenda Policy on student's achievements in TIMSS, PISA and PBTS in private schools in Dubai?
- Is there any significant difference between the results of Dubai private schools in TIMSS 2011 and 2015 tests?
- Is there any significant difference between the results of Dubai private schools in PISA 2011, 2015 and PBTS 2017 tests?
- What are the principals' perceptions on the implementation of the National Agenda Policy in their schools?
- Is there any progress of private schools in Dubai towards achieving the National Agenda Parameter, in their yearly inspection reports within the years 2015-2016-2016-2017 and 2017-2018?
- What are the challenges for private schools in Dubai in implementing the National Agenda Policy?
- What are the lessons learned from implementing in private schools in Dubai the National Agenda Policy, and how to implement it effectively?

This research of an important because it is the first of its kind here at UAE, where the progress of private schools in Dubai towards achieving the National Agenda targets will be examined. It is an important research for policy makers and schools.

Methods of data collection:

Please outline in detail how data will be collected and **attach a copy of any questionnaires, interview schedules or observation guidelines** to be used. Limit = 400 words.

The data of the questionnaire will be collect through online link were a letter will be sent to all private schools principals asking them to participate in the questionnaire voluntary.
The results will be collected from the google forms and extracted to excel sheet with the answers to all questions.
There will be 28 questions with multiple-choice answers and some questions will have an open end answer option.
Analysis of these questions will be implemented based on the responses and hence the research themes to check on the progress of the private schools towards the National agenda targets.
The results of this quantitative analysis will be triangulated with a mixed method analysis with other quantitative and qualitative analysis of the test results of TIMSS and PISA in addition to schools inspection reports over the three academic years 2015-2016, 2016-2017 and 2017-2018 to confirm the findings and explain all of the research questions.

Recruitment of participants:
Please outline the number and type (it may be considered vulnerable) of participants involved; give details of how potential participants will be identified and invited to take part in the study; and how informed consent will be obtained. Limit = 300 words

The principal's surveys will be collected through an online link, were each of them will fill his/her responses on this form.
A short introduction paragraph in the beginning of the survey, were the research will explain the purpose of this survey and research title and the important of having the perceptions of the principals in this research.
It also clarify that the use of the survey results will not identify any of the participant identity or school name.

Please attach a copy of your information sheet(s), draft materials such as interview questions etc. and consent form as well as indication of planned time of issue/use. If you are not using a consent form, please explain why.

☐ Attached

Potential adverse effects on participants and steps to deal with them:
Please outline any potential harm or negative consequences including psychological stress, anxiety or upset which may be induced by the study and the steps to be taken to address them.

There will be no potential effects on participants due to confidentiality and anonymity. Hence, no harm or negative consequences including psychological stress, anxiety or upset will effect on the participants.

If this is a concern for the participant, the researcher a direct phone number and email is shown in the survey introduction letter, in addition to the email address and the phone contacts of the DOS of the researcher are mentioned in the introduction letter of the questionnaire, were the participant could call the research to clarify any issues.

-To ensure the research integrity, the following should be their;

- The use of honest and verifiable methods in proposing, performing, and evaluating research.
- Reporting research results with particular attention to adherence to rules, regulations, guidelines, and
- Following commonly accepted professional codes or norms.

-To ensure Data quality is generally understood to be the degree to which data, including research processes such as data collection and statistical accuracy, meet the needs of users. Among the critical aspects to consider when assessing data for quality are relevance, validity, reliability, objectivity, integrity, completeness, generalizability, and utility.

-Being independent will give you the freedom to do what I want without caring what others think and it will also lead me to find some original solutions to your problems. - Impartial means no part has yet been taken to create an impartial atmosphere, to keep it from appearing to be a popularity contest.
Steps to be taken to ensure confidentiality of data: Please outline steps to ensure confidentiality, privacy and anonymity of data during collection, storage and publication. Please specifically identify any confidential or personal information, and /or any other party's protected intellectual property which you need to use and safeguard.
The questionnaire will be filled by the principals through an online link, where all the questions are annoyance and has no identification to schools or principals. All demographic information in the questionnaire are for the research analysis. Then the collected data will be either protection with passwords to all files and all of these files will be destroyed after the approval of the better.
Steps to be taken to ensure financial and commercial propriety. Please specifically identify any external funding or significant third-party financial involvement with the research.
NA

iii. Declaration by the Researcher:

Having read the University's Research Policy I declare that the information contained herein, is to the best of my knowledge and belief, accurate.

I am satisfied that I have attempted to identify all risks related to the research that may arise in conducting this research and acknowledge my obligations as researcher and the rights of participants. I am satisfied that all researchers (including myself) working on the project have the appropriate qualifications, experience and facilities to conduct the research set out in the attached document and that I, as the lead researcher take full responsibility for the ethical conduct of the research in accordance with subject-specific and University Ethical Guidelines (9.3 Policies and Procedures Manual), as well as any other condition laid down by the BUiD Ethics Committee. I am fully aware of the timelines and content for participant's information and consent.

Print name: Raed Bdeir

Signature:  Date: 22/10/2018

iv. Reviewed by Faculty Member of Research Ethics Committee and passed to Research Ethics Officer for

Electronic Circulation ☑ **Committee Meeting** ☐

v. Endorsement by the Faculty's Research Ethics Committee member (after electronic referral to all Ethics Committee members)

Yes ☑ **No** ☐

vi. **Authorisation by the Vice Chancellor or his nominee on behalf of Research Ethics Committee following virtual (medium risk) or actual (high risk) meeting, signing as Chairman of the Research Ethics Committee of the Research Committee.**

Yes ☐ **No** ☐

The Committee has confirmed that this project fits within the University's Policies for Research and I authorize the proposal on behalf of BUiD's Research Ethics Committee.

Print name: PROF. ASHLY H. PINNINGTON

Signature: _____ Date: 19th November 2018
(Chair of the Research Ethics Committee)

Appendix 3 Research letter sent to Principals

الجامعة البريطانية في دبي
The British University in Dubai
www.buid.ac.ae

12/11/2018

To Whom It May Concern

This is to certify that Mr.Raed Numan Bdeir with Student ID number 2015121128 is a registered full-time student in the Doctor of Education offered by The British University in Dubai since September 2015.

Mr. Raed is currently collecting data for his research (National Agenda Policy on International Assessments: an investigation into the progress of private schools in Dubai (UAE) towards achieving national targets for TIMSS and PISA).
He is required to gather data through conducting surveys that will help him in writing the final research. Your permission to conduct his research in your organisation is hereby requested. Further support provided to his in this regard will be highly appreciated.

Any information given will be used solely for academic purposes.

This letter is issued on Mr.Raed's request.

Yours sincerely,

Dr. Amer Alaya
Head of Academic and Student Administration

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Appendix 4 thematic words for the different tests from the inspection reports over the three years

4.1 Collection of the thematic words in the research for TIMSS grade 4 inspections reports across the three years 2015-2016, 2016-2017 and 2017-2018

Theme 2015-2016	references	%	Theme 2016-2017	references	%	Theme 2017-2018	references	%
attainment Data	42	4%	attainment Data			attainment Data		
ability			ability	22	2%	ability	21	2%
action			action	29	2%	action	41	3%
analysis			analysis	22	2%	analysis	86	6%
assessment			assessment	53	4%	assessment	42	3%
benchmark			benchmark	46	4%	benchmark	45	3%
benchmark tests			benchmark tests	29	2%	benchmark tests		
curriculum			curriculum	33	3%	curriculum	36	3%
data	45	4%	data	59	5%	data	76	6%
development	29	3%	development	24	2%	development	15	1%
early stages			early stages			early stages		
effective			effective			effective	20	1%
individual			individual			individual	23	2%
information			information			information	19	1%
internal assessment			internal assessment			internal assessment	15	1%
leaders			leaders	26	2%	leaders	64	5%
learning	46	4%	learning	48	4%	learning	56	4%
lessons	35	3%	lessons	29	2%	lessons	15	1%
planning	29	3%	planning	52	4%	planning	71	5%
questioning	34	3%	questioning	26	2%	questioning		
registration requirements	74	7%	registration requirements	76	6%	registration requirements	76	6%
requirements	95	8%	requirements	88	7%	requirements	86	6%
research	60	5%	research	60	5%	research	29	2%
research skills	37	3%	research skills	34	3%	research skills	22	2%
improvement			improvement			improvement	20	1%
results			results			results		
school	36	3%	school	28	2%	school	31	2%
skills	138	12%	skills	110	9%	skills	67	5%
strategies			strategies	24	2%	strategies	37	3%
students	73	6%	students	75	6%	students	52	4%
subject	29	3%	subject	30	2%	subject		
targets	28	2%	targets	19	1%	targets	18	1%
teachers	49	4%	teachers	55	4%	teachers	98	7%
technology	40	4%	technology			technology	19	1%
tests	50	4%	tests	61	5%	tests	66	5%
use	28		use	23	2%	use	18	1%
thinking	99	9%	thinking	73	6%	thinking	58	4%

students	37	3%	students	30	2%	students	22	2%
Total	1133	98%	Total	1284	100%	Total	1364	100%

4.2 Collection of the thematic words in the research for TIMSS grade 8 inspections reports across the three years 2015-2016, 2016-2017 and 2017-2018

Theme 2015-2016	references	%	Theme 2016-2017	references	%	Theme 2017-2018	references	%
attainment Data	36	4%	attainment Data			attainment Data		
ability			ability	23	2%	ability	21	2%
action			action	25	2%	action	37	3%
analysis			analysis			analysis	51	4%
assessment			assessment	50	5%	assessment	46	4%
benchmark			benchmark	40	4%	benchmark	40	3%
benchmark tests			benchmark tests	25	2%	benchmark tests		
curriculum			curriculum	28	3%	curriculum	33	3%
data	41	4%	data	52	5%	data	66	5%
development			development	22	2%	development	15	1%
early stages			early stages			early stages		
effective			effective			effective	18	1%
individual			individual			individual	20	2%
information			information			information	19	2%
internal assessment			internal assessment			internal assessment	16	1%
leaders			leaders	23	2%	leaders	44	4%
learning	43	4%	learning	46	4%	learning	51	4%
lessons	34	4%	lessons	24	2%	lessons	16	1%
planning	27	3%	planning	45	4%	planning	67	6%
questioning	31	3%	questioning	26	2%	questioning		
registration requirements	65	7%	registration requirements	68	6%	registration requirements	68	6%
requirements	85	9%	requirements	78	7%	requirements	86	7%
research	47	5%	research	53	5%	research	24	2%
research skills	30	3%	research skills	29	3%	research skills	16	1%
improvement			improvement			improvement	20	2%
results			results			results	16	1%
school	34	4%	school	25	2%	school	24	2%
skills	113	12%	skills	96	9%	skills	58	5%
strategies			strategies	22	2%	strategies	30	2%
students	63	7%	students	62	6%	students	46	4%
subject	24	2%	subject	27	2%	subject		
targets	24	2%	targets	20	2%	targets	16	1%
teachers	46	5%	teachers	50	5%	teachers	74	6%

technology	37	4%	technology			technology	16	1%
tests	42	4%	tests	55	5%	tests	63	5%
use	25	3%	use			use	19	2%
thinking	88	9%	thinking	65	6%	thinking	51	4%
students	31	3%	students	23	2%	students	20	2%
Total	966	100%	Total	1102	100%	Total	1207	100%

4.3 Collection of the thematic words in the research for PISA inspections reports across the three years 2015-2016, 2016-2017 and 2017-2018

Theme 2015-2016	references	%	Theme 2016-2017	references	%	Theme 2017-2018	references	%
attainment Data	34	4%	attainment Data			attainment Data		
ability			ability	23	2%	ability	20	2%
action			action	24	2%	action	36	3%
analysis			analysis	21	2%	analysis	51	4%
assessment			assessment	49	4%	assessment	43	4%
benchmark			benchmark	42	4%	benchmark	41	4%
benchmark tests			benchmark tests	28	3%	benchmark tests		
curriculum			curriculum	27	2%	curriculum	30	3%
data	39	4%	data	52	5%	data	64	6%
development	23	2%	development	19	2%	development	15	1%
early stages			early stages			early stages	15	1%
effective			effective			effective	16	1%
individual			individual			individual	18	2%
information			information			information	18	2%
internal assessment			internal assessment			internal assessment	15	1%
leaders			leaders	22	2%	leaders	41	4%
learning	46	5%	learning	45	4%	learning	47	4%
lessons	35	4%	lessons	21	2%	lessons	15	1%
planning	30	3%	planning	42	4%	planning	65	6%
questioning	30	3%	questioning	27	2%	questioning		
registration requirements	64	7%	registration requirements	66	6%	registration requirements	66	6%
requirements	84	9%	requirements	75	7%	requirements	74	6%
research	47	5%	research	51	5%	research	25	2%
research skills	29	3%	research skills	27	2%	research skills	17	1%
improvement			improvement			improvement	16	1%
results			results			results	16	1%
school	35	4%	school	23	2%	school	22	2%
skills	112	12%	skills	91	8%	skills	59	5%
strategies			strategies	20	2%	strategies	29	3%
students	61	6%	students	57	5%	students	43	4%
subject	24	3%	subject	27	2%	subject		

targets	24	3%	targets	20	2%	targets		
teachers	46	5%	teachers	48	4%	teachers	90	8%
technology	37	4%	technology			technology		
tests	42	4%	tests	61	5%	tests	63	5%
use			use	19	2%	use	19	2%
thinking	85	9%	thinking	63	6%	thinking	50	4%
students	29	3%	students	22	2%	students	18	2%
Total	956	100%	Total	1112	100%	Total	1157	100%

4.4 Collection of the thematic words in the research for PBTS and PISA inspections reports across the three years 2015-2016, 2016-2017 and 2017-2018

Theme 2015-2016	references	%	Theme 2016-2017	references	%	Theme 2017-2018	references	%
attainment Data	31	3%	attainment Data			attainment Data		
ability			ability	19	2%	ability	41	4%
action			action	23	2%	action	33	3%
analysis			analysis	21	2%	analysis	25	2%
assessment			assessment	45	4%	assessment	42	4%
benchmark			benchmark	40	4%	benchmark	38	3%
benchmark tests			benchmark tests	28	3%	benchmark tests		
curriculum			curriculum	26	2%	curriculum	29	3%
data	36	4%	data	50	5%	data	59	5%
development	23	2%	development	19	2%	development	15	1%
early stages			early stages			early stages	15	1%
effective			effective			effective	16	1%
individual			individual			individual	19	2%
information			information			information	19	2%
internal assessment			internal assessment			internal assessment	15	1%
leaders			leaders	20	2%	leaders	37	3%
learning	45	5%	learning	42	4%	learning	46	4%
lessons	34	4%	lessons	23	2%	lessons	15	1%
planning	28	3%	planning	42	4%	planning	62	6%
questioning	29	3%	questioning	27	2%	questioning		
registration requirements	61	6%	registration requirements	63	6%	registration requirements	64	6%
requirements	79	8%	requirements	73	7%	requirements	72	6%
research	45	5%	research	53	5%	research	25	2%
research skills	26	3%	research skills	28	3%	research skills	33	3%
improvement			improvement			improvement	16	1%
results			results			results	16	1%
school	30	3%	school	22	2%	school	20	2%
skills	108	11%	skills	91	8%	skills	52	5%

strategies			strategies	20	2%	strategies	28	2%
students	63	7%	students	56	5%	students	40	4%
subject	24	3%	subject	27	2%	subject		
targets	22	2%	targets	19	2%	targets		
teachers	44	5%	teachers	44	4%	teachers	87	8%
technology	61	6%	technology			technology		
tests	42	4%	tests	57	5%	tests	61	5%
use			use	19	2%	use	20	2%
thinking	82	9%	thinking	61	6%	thinking	48	4%
students	30	3%	students	23	2%	students	17	2%
Total	943	100%	Total	1081	100%	Total	1125	100%

Appendix 5 TIMSS, PISA and PBTS test results

5.1 TIMSS 2011 and 2015 results

Test year G4	Mark MathG4	Test Year G4	Mark Science	Test Year G8	Mark Math G8	Test Year G8	Mark Science G8
42011	539	42011	524	82011	524	82011	520
42011	538	42011	542	82011	519	82011	531
42011	481	42011	472	82011	454	82011	468
42011	401	42011	377	82011	434	82011	437
42011	496	42011	500	82011	473	82011	472
42011	402	42011	384	82011	424	82011	400
42011	351	42011	331	82011	408	82011	385
42011	454	42011	444	82011	461	82011	460
42011	452	42011	442	82011	474	82011	481
42011	487	42011	484	82011	495	82011	493
42011	415	42011	409	82011	473	82011	478
42011	522	42011	507	82011	558	82011	567
42011	382	42011	387	82011	444	82011	451
42011	395	42011	360	82011	408	82011	411
42011	584	42011	592	82011	555	82011	572
42011	469	42011	463	82011	490	82011	516
42011	472	42011	478	82011	493	82011	520
42011	411	42011	392	82011	415	82011	410
42011	566	42011	564	82011	563	82011	569
42011	405	42011	381	82011	453	82011	440
42011	396	42011	374	82011	376	82011	360
42011	533	42011	531	82011	524	82011	530
42011	572	42011	584	82011	336	82011	313
42011	323	42011	290	82011	548	82011	561
42011	572	42011	557	82011	448	82011	430
42011	452	42011	434	82011	557	82011	561
42011	543	42011	538	82011	452	82011	459
42011	414	42011	406	82011	457	82011	431
42011	392	42011	369	82011	572	82011	583
42011	436	42011	427	82011	402	82011	400
42011	533	42011	550	82011	439	82011	440
42011	398	42011	381	82011	518	82011	522

Test year G4	Mark MathG4	Test Year G4	Mark Science	Test Year G8	Mark Math G8	Test Year G8	Mark Science G8
42011	433	42011	425	82011	526	82011	521

42011	546	42011	527	82011	557	82011	569
42011	482	42011	486	82011	526	82011	543
42011	589	42011	580	82011	508	82011	528
42011	433	42011	425	82011	545	82011	541
42011	493	42011	479	82011	459	82011	450
42011	487	42011	486	82011	518	82011	534
42011	512	42011	508	82011	460	82011	474
42011	558	42011	544	82011	435	82011	438
42011	427	42011	408	82011	464	82011	474
42011	509	42011	513	82011	433	82011	441
42011	469	42011	463	82011	440	82011	438
42011	424	42011	425	82011	360	82011	338
42011	443	42011	422	82011	400	82011	377
42011	404	42011	391	82011	418	82011	434
42011	543	42011	543	82011	358	82011	357
42011	350	42011	328	82011	498	82011	508
42011	369	42011	353	82011	505	82011	525
42011	376	42011	345	82011	487	82011	517
42011	371	42011	350	82011	357	82011	346
42011	409	42011	392	82011	471	82011	475
42011	327	42011	291	82011	509	82011	521
42011	490	42011	485	82011	562	82011	573
42011	460	42011	447	82011	541	82011	546
42011	360	42011	320	82011	543	82011	556
42011	429	42011	436	82011	439	82011	444
42011	482	42011	489	82011	432	82011	441
42011	473	42011	474	82011	469	82011	467
42011	474	42011	471	82011	561	82011	588
42011	485	42011	475	82011	555	82011	539
42011	554	42011	551	82011	547	82011	561
42011	421	42011	403	82011	467	82011	477

Test year G4	Mark MathG4	Test Year G4	Mark Science	Test Year G8	Mark Math G8	Test Year G8	Mark Science G8
42011	506	42011	476	82011	536	82011	546
42011	409	42011	380	82011	482	82011	493
42011	472	42011	459	82011	528	82011	538
42011	503	42011	498	82011	517	82011	534
42011	489	42011	489	82011	473	82011	476
42011	505	42011	512	82011	521	82011	527

42011	456	42011	457	82015	623	82015	630
42011	524	42011	503	82015	554	82015	580
42011	532	42011	527	82015	437	82015	442
42011	498	42011	494	82015	454	82015	457
42011	513	42011	503	82015	465	82015	474
42011	468	42011	463	82015	432	82015	437
42011	518	42011	524	82015	394	82015	408
42011	525	42011	528	82015	495	82015	514
42015	623	42015	638	82015	522	82015	550
42015	564	42015	576	82015	486	82015	512
42015	415	42015	414	82015	500	82015	515
42015	423	42015	423	82015	600	82015	620
42015	462	42015	458	82015	549	82015	550
42015	421	42015	419	82015	454	82015	463
42015	429	42015	430	82015	571	82015	575
42015	475	42015	487	82015	484	82015	508
42015	498	42015	504	82015	512	82015	547
42015	501	42015	515	82015	480	82015	519
42015	472	42015	478	82015	573	82015	593
42015	553	42015	560	82015	448	82015	463
42015	503	42015	495	82015	497	82015	498
42015	442	42015	468	82015	631	82015	634
42015	624	42015	609	82015	370	82015	368
42015	524	42015	542	82015	595	82015	591
42015	521	42015	521	82015	466	82015	472
42015	519	42015	520	82015	564	82015	587

Test year G4	Mark MathG4	Test Year G4	Mark Science	Test Year G8	Mark Math G8	Test Year G8	Mark Science G8
42015	528	42015	537	82015	450	82015	465
42015	477	42015	491	82015	501	82015	489
42015	441	42015	443	82015	592	82015	601
42015	559	42015	562	82015	584	82015	556
42015	661	42015	660	82015	442	82015	466
42015	422	42015	413	82015	551	82015	551
42015	613	42015	613	82015	448	82015	462
42015	457	42015	439	82015	560	82015	560
42015	561	42015	575	82015	510	82015	545
42015	449	42015	445	82015	536	82015	556
42015	403	42015	396	82015	545	82015	541

42015	450	42015	433	82015	495	82015	516
42015	559	42015	572	82015	513	82015	528
42015	600	42015	569	82015	484	82015	505
42015	454	42015	467	82015	479	82015	481
42015	537	42015	527	82015	501	82015	534
42015	468	42015	478	82015	458	82015	428
42015	590	42015	568	82015	528	82015	549
42015	483	42015	501	82015	474	82015	469
42015	563	42015	590	82015	515	82015	494
42015	520	42015	529	82015	495	82015	516
42015	574	42015	570	82015	395	82015	402
42015	556	42015	570	82015	587	82015	567
42015	514	42015	499	82015	525	82015	555
42015	500	42015	510	82015	534	82015	565
42015	476	42015	476	82015	414	82015	414
42015	481	42015	528	82015	494	82015	503
42015	549	42015	582	82015	626	82015	650
42015	348	42015	328	82015	523	82015	553
42015	581	42015	575	82015	554	82015	556
42015	471	42015	451	82015	590	82015	599
42015	406	42015	424	82015	454	82015	483

Test year G4	Mark MathG4	Test Year G4	Mark Science	Test Year G8	Mark Math G8	Test Year G8	Mark Science G8
42015	530	42015	511	82015	561	82015	587
42015	518	42015	515	82015	612	82015	656
42015	486	42015	497	82015	572	82015	583
42015	401	42015	389	82015	596	82015	567
42015	551	42015	582	82015	569	82015	585
42015	513	42015	522	82015	448	82015	472
42015	436	42015	438	82015	515	82015	516
42015	479	42015	492	82015	574	82015	577
42015	637	42015	655	82015	536	82015	548
42015	559	42015	580	82015	552	82015	560
42015	537	42015	548	82015	447	82015	466
42015	518	42015	528	82015	538	82015	541
42015	560	42015	564				
42015	450	42015	456				
42015	581	42015	571				
42015	540	42015	565				

42015	605	42015	600
42015	562	42015	573
42015	549	42015	591
42015	553	42015	583
42015	459	42015	501
42015	526	42015	513
42015	589	42015	605
42015	513	42015	522
42015	586	42015	602
42015	460	42015	496
42015	521	42015	512
42015	528	42015	536

5.2 PISA 2012, 2015 and PBTS 2017 results

Test year 2012-2015	Mark Math	Mark Science	Mark reading	Test Year PBTS 2017-PISA 2015	Mark Math	Mark Science	Mark reading
2012	503	540	516	2015	539	549	529
2012	509	515	514	2015	506	536	556
2012	396	389	373	2015	447	411	377
2012	461	464	479	2015	433	428	438
2012	439	446	459	2015	453	463	483
2012	499	484	422	2015	424	441	440
2012	383	392	376	2015	404	406	405
2012	453	434	452	2015	486	486	494
2012	470	469	476	2015	467	483	493
2012	459	503	526	2015	464	484	505
2012	443	455	476	2015	468	466	467
2012	574	567	549	2015	524	553	542
2012	381	411	395	2015	481	470	443
2012	426	423	424	2015	451	451	449
2012	568	567	580	2015	536	569	567
2012	489	524	500	2015	444	491	471
2012	474	504	412	2015	536	526	541
2012	490	484	494	2015	395	395	404
2012	425	402	390	2015	378	395	411
2012	391	363	353	2015	527	546	532
2012	562	479	513	2015	373	367	352
2012	392	358	347	2015	527	541	543
2012	546	591	569	2015	382	385	371

2012	440	420	425	2015	528	540	540
2012	530	533	551	2015	463	490	507
2012	413	431	399	2015	443	437	437
2012	549	570	583	2015	414	441	410
2012	482	503	489	2015	522	530	539
2012	449	443	436	2015	466	459	464
2012	527	534	515	2015	453	458	458
2012	464	492	472	2015	538	526	498
2012	543	547	543	2015	420	427	395

Test year 2012-2015	Mark Math	Mark Science	Mark reading	Test Year PBTS 2017-PISA 2015	Mark Math	Mark Science	Mark reading
2012	497	509	516	2015	537	556	563
2012	470	479	488	2015	504	514	520
2012	529	520	520	2015	519	531	534
2012	407	406	408	2015	511	542	528
2012	506	503	503	2015	429	430	425
2012	463	465	487	2015	478	486	492
2012	454	464	457	2015	461	464	468
2012	412	416	419	2015	467	466	461
2012	335	354	335	2015	370	361	365
2012	359	405	403	2015	497	501	509
2012	476	478	464	2015	485	491	496
2012	448	446	437	2015	411	416	419
2012	389	389	404	2015	448	437	435
2012	412	419	409	2015	469	469	469
2012	420	438	408	2015	553	531	518
2012	482	498	485	2015	463	492	497
2012	517	517	523	2015	379	358	355
2012	485	491	469	2015	473	494	498
2012	340	341	350	2015	520	542	528
2012	471	482	491	2015	547	561	546
2012	489	519	533	2015	486	513	490
2012	577	570	563	2015	476	488	485
2012	514	497	504	2015	426	438	431
2012	527	528	518	2015	455	452	401
2012	436	447	439	2015	497	501	499
2012	297	298	243	2015	544	592	572

2012	422	425	411	2015	555	567	561
2012	418	434	418	2015	525	541	551
2012	552	590	571	2015	456	464	462
2012	573	587	566	2015	493	508	511
2012	510	528	522	2015	476	486	501
2012	481	468	477	2015	482	505	500

Test year 2012-2015	Mark Math	Mark Science	Mark reading	Test Year PBTS 2017-PISA 2015	Mark Math	Mark Science	Mark reading
2012	443	453	459	2015	465	468	476
2012	509	525	518	2017	577	538	522
2012	470	485	480	2017	560	551	533
2012	459	439	445	2017	353	395	365
2015	539	549	529	2017	400	431	428
2015	506	536	556	2017	436	453	449
2015	447	411	377	2017	410	409	426
2015	433	428	438	2017	378	402	387
2015	453	463	483	2017	529	508	493
2015	424	441	440	2017	478	486	464
2015	404	406	405	2017	456	494	499
2015	486	486	494	2017	505	497	497
2015	467	483	493	2017	533	550	524
2015	464	484	505	2017	508	449	379
2015	468	466	467	2017	450	456	436
2015	524	553	542	2017	585	554	572
2015	481	470	443	2017	493	492	489
2015	451	451	449	2017	539	521	526
2015	536	569	567	2017	442	451	443
2015	444	491	471	2017	449	472	456
2015	436	423	389	2017	553	535	530
2015	536	526	541	2017	342	367	361
2015	395	395	404	2017	569	554	553
2015	378	395	411	2017	414	435	399
2015	527	546	532	2017	551	550	552
2015	373	367	352	2017	493	466	461
2015	527	541	543	2017	470	450	437
2015	382	385	371	2017	467	490	428
2015	528	540	540	2017	591	554	554
2015	414	441	410	2017	423	485	474

2015	522	530	539	2017	435	454	459
2015	466	459	464	2017	562	550	552

Test year 2012-2015	Mark Math	Mark Science	Mark reading	Test Year PBTS 2017-PISA 2015	Mark Math	Mark Science	Mark reading
2015	453	458	458	2017	438	471	466
2015	538	526	498	2017	570	554	569
2015	420	427	395	2017	535	517	535
2015	537	556	563	2017	604	543	540
2015	504	514	520	2017	541	542	537
2015	519	531	534	2017	372	411	395
2015	511	542	528	2017	539	528	547
2015	429	430	425	2017	492	469	470
2015	478	486	492	2017	372	413	405
2015	478	486	483	2017	416	417	396
2015	461	464	468	2017	546	525	531
2015	467	466	461	2017	516	400	403
2015	370	361	365	2017	421	395	398
2015	340	344	340	2017	492	472	471
2015	497	501	509	2017	509	472	471
2015	485	491	496	2017	538	526	515
2015	411	416	419	2017	507	523	515
2015	448	437	435	2017	363	398	380
2015	398	397	426	2017	453	484	478
2015	469	469	469	2017	551	546	543
2015	553	531	518	2017	604	582	565
2015	463	492	497	2017	571	538	521
2015	379	358	355	2017	464	463	463
2015	473	494	498	2017	436	431	449
2015	520	542	528	2017	468	465	469
2015	547	561	546	2017	533	532	521
2015	486	513	490	2017	599	583	558
2015	506	523	514	2017	571	535	541
2015	476	488	485	2017	559	539	544
2015	426	438	431	2017	457	491	464
2015	455	452	401	2017	489	507	502

2015	497	501	499	2017	483	494	491

Test year 2012-2015	Mark Math	Mark Science	Mark reading	Test Year PBTS 2017-PISA 2015	Mark Math	Mark Science	Mark reading
2015	544	592	572	2017	518	515	512
2015	555	567	561	2017	468	484	490
2015	525	541	551				
2015	456	464	462				
2015	493	508	511				
2015	476	486	501				
2015	482	505	500				
2015	465	468	476				

Appendix 6 sample of National Agenda text in School inspection reports for three academic year in the three test

No.	2015-2016	2016-2017	2017-2018
1	The school met the registration requirements of the National Agenda Parameter. Progress towards meeting the National Agenda targets was not fully secure. The school promoted awareness and understanding of the National Agenda targets among its staff through regular discussion at staff meetings, lesson planning discussions and training sessions. Parents, students and governors had a clear understanding of the National Agenda and understood the scope and purpose of participating in international testing. The school had aligned the English, mathematics and science curricula to the TIMSS and PISA test requirements. Additional content had been included in subject schemes of work. For example, Earth science had been added in Year 5. Teachers' lesson plans included the promotion of critical thinking, independent learning and opportunities for students to develop their research skills. In addition, leaders had ensured professional	school meets the registration requirements for the National Agenda Parameter. Attainment based on the National Agenda Parameter benchmark tests is above expectations in mathematics and science. In English, attainment is secure but not consistent across all grades. The school has effectively analysed the National Agenda Parameter benchmark reports for 2015/16 and has developed a detailed action plan to improve the standards of education. Leaders have identified gaps in the curriculum relative to the National Agenda. Comprehensive training is provided to assist school leaders and staff in analysing and interpreting the National Agenda Parameter results. The school has strengthened its curriculum in English, mathematics and science by adopting a common set of international benchmark standards from the top performing PISA and TIMSS nations. This enables the students to be equipped with the knowledge and skills to be globally competitive. Teachers use questioning to prompt students into forming their own lines of enquiry and investigation in order to develop critical thinking skills. Students in the primary and secondary phases engage in a range of open ended investigations but not consistently	Attainment in the National Agenda Parameter (N.A.P) in English, mathematics and science is above expectations. The school meets the registration requirements for the N.A.P. The school's National Agenda information impacts on clear strategic developments, in the action plan targeted at raising the quality of teaching and students' attainment. The analysis of all the data is thorough and identifies strengths and weaknesses. This information is used by teachers to personalise their planning. The thorough analysis, undertaken by the school, has enabled adaptation of the curriculum to meet the demands of TIMSS and PISA. The focus on critical thinking and problem solving is an improving feature of lessons and it is impacting on students' learning. It is a strong feature in mathematics. Lessons are focused on the engagement of students through critical thinking. Their research skills are enhanced through the use of technology and innovative project work.

	development sessions for all staff to focus on further developing their use of questioning. The majority of lessons in English, mathematics and science promoted the development of students' critical thinking as outlined in the National Agenda. Teachers allowed students time for thinking and encouraged discussion. Problem solving, discussion and investigation were fundamental to students' learning. This was particularly the case in upper secondary. Most students gathered a wide range of information from different sources, demonstrating creative skills in sharing and presenting their learning. A range of learning technologies and other resources were available for students to develop their research skills.	across the school. In the secondary phase, older students form hypotheses and evaluate their findings in order to reach informed conclusions. The school has demonstrated commitment to developing students' research skills as a sound basis for life-long learning. In most year groups, students are now developing more independence in their learning and can form their own lines of enquiry. Older students are able to access information and extract the required insights to form critical evaluations. Overall the school's improvement towards achieving its National Agenda targets is above expectations.	Overall, the school's provision for achieving National Agenda targets meets expectations.
2	The school did not fully meet the registration requirements of the National Agenda Parameter. The attainment data was not sufficient to make a full judgement on the progress towards meeting National Agenda targets. The school had made a great effort to embrace and promote the National Agenda in all aspects. All stakeholders were aware of the National Agenda and the targets set	Attainment as measured by the National Agenda Parameter tests in English, mathematics and science meets expectations. The school meets the registration requirements for the National Agenda Parameter. There is a thorough analysis of the data from the National Agenda Parameter. Using the data from IBT, the analysis is completed down to question level for each student. The analysis of CAT 4 is used to help students and teachers to recognise and	Attainment, as indicated by the National Agenda Parameter tests is above expectations. The school meets the registration requirements for the National Agenda Parameter. The school leadership is fully committed to the National Agenda. The action plan priorities the need for improved student achievements through changes to teaching and curricular. The data analysis of the National Agenda Parameter tests is fully integrated into the overall school

	for the school. However, the students were not well versed in the detail. They recognised the overarching aim to improve the quality of education in the UAE. Considerable attention had been given to TIMSS and PISA by the school. The analysis of previous outcomes had led subject leaders to adjust their curricula so that topics absent from plans were addressed. Curriculum modifications included an emphasis on critical thinking and investigative learning. There had been some impact from teacher strategies to develop critical thinking and enquiry. However, the development was at a very early stage. There were very few examples seen of lessons where critical thinking was the central focus. There were only limited examples of where students were given the opportunity to use a range of resources to research, evaluate and present their findings.	understand learning preferences. As a consequence of this analysis the students develop targets, in consultation with teachers. These targets are shared with parents. Analysis of the benchmarking tests is used to identify curriculum gaps and then aligned with the curriculum so that teachers are planning against the mapped curriculum. A considerable amount of work is done by the school to ensure that the curriculum covers all aspects of the key subjects. Where gaps have been discovered these have been addressed, for example, earth sciences and geometry in science and mathematics. A further exercise is carried out to align the curriculum with the English National Curriculum programmes of study. Each component is translated into a 'Can do' statement which forms part of the continuous assessment process. The curriculum is mapped and aligned to meet the requirements of TIMSS and PISA. Approaches to teaching have been modified to enable teachers to address the expectations of the National Agenda. Planning is more focused on the student and the objective of each lesson. The sharing of objectives is a prominent feature and most teachers involve students in the explanation of what is expected by the end of the session. Planning includes 3 levels of task together with an emphasis on the composition of groups. There is an awareness of the	assessment practices. This enables teachers to adapt their teaching to suit the needs of all students. All relevant National Agenda Parameter data is triangulated against internal curriculum data to find the right curriculum and learning pathways for students. All the core subjects have developed procedures to enrich curriculum opportunities. There is a focus on skill development to deliver high outcomes. With the increased knowledge of their potential, and success in international tests, students have become well-rounded learners, organised and reflective in everything they do. Overall, the school's provision for achieving National Agenda targets is above expectations

		value of assessment for learning including open questioning, which staff realise is beneficial to good learning. However, this is an area that is still developing across the school. Most students have a good understanding of their results which is seen in the targets that have been developed for students and with students. The students are appraised of what the outcome of the CAT 4 test is and what it means. Armed with this knowledge they are able with the help of the teacher to set personal goals related to their learning style. With the curriculum standards aligned to the programmes of study students develop personal subject specific targets. Opportunities are provided through, key subject projects and discrete weeks, to pursue individual research projects. Overall, the school's improvements in its provision towards achieving its National Agenda targets meet expectations.	
3	The school met the registration requirements of the National Agenda Parameter. The attainment data was not sufficient to make a full judgement on the progress towards meeting National Agenda targets. Both parents and the governors had only a superficial awareness and understanding of the National Agenda. They did not know that	The school meets the registration requirements for the National Agenda Parameter Students in the school have not completed assessments in any National Agenda Parameter test. There is, therefore, insufficient valid data available to make judgements against international benchmarks on the attainment in English, mathematics, and science.	There is insufficient data available to make a judgment on students' attainment in English, mathematics, science or Arabic. The school meets the registration requirements for the National Agenda Parameter. Senior leaders have not developed a National Agenda action plan, nor are they aware of the need to improve their performance to meet the National Agenda targets.

	it was closely linked to target setting. The lack of awareness amongst both the parents and the governors indicated the fact that this school had not fully understood the importance of the National Agenda Parameter as a vehicle for school improvement. Currently, the alignment of the curriculum to meet the content and skills requirements of TIMSS and PISA were under-developed features. During the inspection the importance of this was stressed in order to meet the needs of all of the students. A large majority of teachers did not use effective strategies to develop critical thinking and inquiry. Much of the classroom delivery was teacher centered and aligned to MoE textbook. Even in those lessons where some open ended questioning was observed, teachers missed the opportunity to develop dialogue or discussion. The use of resources was largely restricted to textbooks and supplementary worksheets. The use, by students, of technology within classrooms to encourage independent learning and	No analysis of international data has been completed. The students currently in Grades 4, 6 and 8 have taken part in the CAT4 test. There has been little dissemination of the outcomes. The school is registered for the National Assessment Programme (UAE NAP) but, at the time of the inspection, no students had taken the assessment. Some broad alignment is in place as a result of analysing the style of questioning in the TIMSS and PISA tests. There is an increasing emphasis on problem-solving and an awareness of the need to promote critical thinking. In mathematics, teachers are linking work more closely to the real world, modelling UAE buildings as part of measurement. Activities in English and science are encouraging more investigation and research as part of the broader curriculum. Staff training focuses on questioning techniques, recognising the need to challenge students and encourage thinking skills. In science, for example, students are asked to consider locating a nuclear power station in the Emirate, researching areas and determining the most suitable outcome. However, overall, the adjustments to teaching strategies are limited and require further changes to meet the demands of the National Agenda. There is only a small number of examples of high quality activities designed to prepare students to meet future targets.	The school has recently received results from the cognitive ability tests (CAT4) for students from Grades 4, 6 and 8. However, the school has not analysed these results, UAE NAP results or the IBT results to highlight strengths and areas for development. The school has not yet aligned the curriculum in English, mathematics and science to the expectations of international assessments. Consequently, modification to the curriculum remains an underdeveloped area. Adjustments to teaching strategies are limited. A focus on the use of critical thinking and investigative work is not evident. The access and use of modern technologies is not a strong feature of the curriculum nor embedded in learning. All research activities that are related to project work are conducted at home. Overall, the school's provision for achieving National Agenda targets is below expectations.

	research, was rarely observed. There were only a limited number of teacher produced resources, manipulative and science resources.	Resources are limited although students do have access to the small school library. The access and use of modern technologies is not a strong feature of the curriculum. Students take part in research activities but less frequently across key subjects which is necessary to develop the required skills. Overall, the school's improvement towards achieving its National Agenda targets is not secure.	
4	The school did not meet the registration requirements of the National Agenda Parameter. No attainment data from the National Agenda Parameter was available at this stage to make a judgment on progress towards meeting the National Agenda targets. The school had promoted awareness of the National Agenda and National Agenda targets among the governing board and parents, but not a well-developed understanding. Students were not specifically aware of the National Agenda, although they were aware of international testing through international benchmark tests. The curriculum had been aligned to the TIMSS and PISA test requirements for content and skills in all grade levels. Planning was focused on students'	The school does not fully meet the registration requirements for the National Agenda Parameter. Attainment in English, mathematics and science on the National Agenda Parameter is not secure. The school has organized some training for teachers on how to interpret the results of Cognitive Ability Tests (CAT4) and use the results to match teaching approaches to students' learning needs. Teachers are starting to use the results of Measures of Academic Progress (MAP) tests to set achievement goals for their students. They have not used the results of MAP tests to align their own internal assessment procedures to international standards. The school has aligned its science curriculum with the Next Generation Science Standards (NGSS) and believes that this is sufficient to prepare students for the science parts of TIMSS and PISA tests. In mathematics, the focus has been on giving greater emphasis to problem-solving. In reading, teachers match their questions and texts to the format of PISA	Students' attainment on the National Agenda Parameter (N.A.P.) tests in English, mathematics and science is below expectations. The school meets the registration requirements for the National Agenda Parameter. The whole-school and departmental National Agenda action plans identify the key strategies to secure improved performance on future international assessments. CAT4 data is effectively used in the identification of students who have SEND. The school does not align CAT4 with internal assessments to use it to inform self-evaluation and school improvement priorities. The school is modifying the curriculum appropriately to include TIMSS and PISA requirements in both content and skills.□ Most teachers do not make appropriate adjustments to teaching strategies based on an analysis of CAT4 or MAP data. □ Some students are aware of their own

	progression and continuity in subject skills and knowledge which were relevant to the National Agenda. Some professional development and resources were provided to develop teachers' questioning skills and the promotion of critical thinking. Their impact was not yet consistent. Across the phases, teaching was variable in how well it promoted the development of students' critical thinking, reflection and independent learning skills. In English, mathematics and science, each subject had strong examples of practice in this area but overall, there was inconsistency. A majority of students used learning technologies and other resources to support the development of their research skills as aligned to National Agenda testing requirements. The use of computer stations was the norm in Grades 1 to 4. Older students shared tablet computers.	tests. The results of the MAP tests have not been used sufficiently to modify the curriculum. The school is at an early stage of using CAT4 and MAP data to adjust teaching approaches. There is some use of online resources, but these are mainly drill and practice activities in which students answer short-response questions and get immediate feedback. Students are rarely asked to tackle open-ended problems or think critically, although some examples are evident in science, such as students' thinking about possible strategies to deal with the decreasing population of whales. Students who have taken MAP tests are familiar with their individual results and have set goals for themselves with help from teachers. Students' use of learning technologies to carry out independent research, investigations, and enquiry activities are not well embedded in the curriculum. Overall, the school's improvement towards achieving its National Agenda targets is not secure.	results on the international benchmark tests. Older students are skilled in using learning technologies to develop their research skills. Overall, the school's provision for achieving National Agenda targets is not secure.