

Performance Audit

Class Size in State Primary Schools

Report by the Auditor General

June 2015





Performance Audit

Class Size in State Primary Schools

Table of Contents

List of Abbreviations	4
Executive Summary	5
Chapter 1 – Terms of reference	11
1.1 Introduction	12
1.2 The education process is characterized by various inputs and outputs	12
1.3 Audit objectives	13
1.4 Audit methodology	13
1.5 Report structure	14
Chapter 2 – Declining class size in state primary schools	15
2.1 Introduction	16
2.2 Class size in primary schools is dependent on the input of a number of players	16
2.3 The demand for primary school services varied over the years	17
2.4 The average number of students per classroom is significantly lower than the maximum allowed by Regulations	19
2.5 The pupil to teacher ratio is on the decrease and lower than the EU average	20
2.6 Smaller class sizes reap no additional academic benefit	21
2.7 Conclusions	23
Chapter 3 – Limiting factors influencing the number of students per class	25
3.1 Introduction	26
3.2 The quest to operate a state primary school in every locality has historically influenced class size rationalization strategies	26
3.3 Infrastructural limitations generally hindered more effective class size rationalization	28
3.4 Conclusions	29
Chapter 4 – Class size rationalization	31
4.1 Introduction	32
4.2 State primary schools' annual operating expenditures amounted to €68 million	32
4.3 Operational costs per student increase significantly for smaller schools	33
4.4 In some cases, state primary school buildings are not being fully exploited	33
4.5 Four case studies highlight the feasibility of merging low student population primary schools	35
4.6 On the basis of operational savings, the merging of low population schools is financially feasible	41
4.7 Conclusions	42
Appendices	
Appendix I – Organizational chart, Ministry for Education and Employment	44
Appendix II – Correlation between class size and academic achievement by Years 4, 5 and 6 students in the three core subjects	45
Appendix III – Class spare capacity in state primary schools	50

Tables

Table 1: Average class size per grade in primary schools (scholastic year 2013-2014)	20
Table 2: Case studies reviewed by NAO to optimize class size utilization	36
Table 3: Cost savings through accommodating the current Gudja School population at Luqa Primary School	37
Table 4: Viability of merging Gudja and Għaxaq Primary Schools based on a range of investment costs	38
Table 5: Viability of merging San Lawrenz and Għarb Primary Schools based on a range of investment costs	39
Table 6: Viability of amalgamating five small primary schools in Gozo into one newly built school	40
Table 7: Potential operational costs savings through the merging of five low populated primary schools	41
Table 8: Payback periods of potential investment solely through net operational savings	42

Figures

Figure 1: Education process	13
Figure 2: Organizational structure for state primary schools	17
Figure 3: Primary schools' student population (2001 to 2014)	18
Figure 4: Average number of students per classroom in state primary schools (scholastic year 2013-2014)	19
Figure 5: Pupil to teacher ratio in primary schools (1971 to 2010)	21
Figure 6: Average standardized score vs class size (2013-2014)	22
Figure 7: Relationship between class size and, science and mathematics attainment at primary level	23
Figure 8: Average number of students per class vs primary school student population (scholastic year 2013-2014)	27
Figure 9: Average classroom area in state primary schools	28
Figure 10: Expenditure in primary schools (scholastic year 2013-2014)	33
Figure 11: Primary school student population and the respective average operational costs per student (scholastic year 2013-2014)	34

List of Abbreviations

DES	Directorate for Educational Services
DQSE	Directorate for Quality and Standards in Education
EU	European Union
MEDE	Ministry for Education and Employment
NAO	National Audit Office
NPV	Net Present Value
OD	Operations Department
PTR	Pupil-Teacher Ratio
S.L.	Subsidiary Legislation
TIMSS	Trends in International Mathematics and Science Studies
UK	United Kingdom

Executive summary

Executive summary

Audit focus

1. This performance audit sought to determine the extent to which the resources allocated for the operation of state primary schools are being utilized in a cost-efficient manner. Various inputs are required to enable the effective operation of the educational process at primary stage, mainly school leadership, teaching quality, students' socio-economic background, financial expenditure and class size. Towards this end, the audit primarily assessed the impact of school population and the respective number of students in each classroom on the resources required to sustain the operation of these schools.
2. The National Audit Office (NAO) embarked on this audit since the excessively low student populated state primary schools are taking up the limited resources made available to the Education Directorates within the Ministry for Education and Employment (MEDE). During scholastic year 2013-2014, operational costs per student varied significantly between schools, that is, by up to around 3.4 times, from €2,660 to €9,162, the latter pertaining to a primary school with a low student population.
3. Against this backdrop, the objectives of this performance audit were to determine the extent to which:
 - i. a strategic and operational framework is in place to enable a potential range of the number of students in state primary school classes, which consider the local contextual realities;
 - ii. the number of students in a classroom influences their educational and social development; and
 - iii. resources available for the operation of these schools are being utilized cost-efficiently.
4. The undertaking of this study entailed interviewing key personnel at the Education Directorates. Moreover, the NAO reviewed data and other information mainly related to student and staff populations, examination scores, infrastructural resources, as well as the respective operational expenses incurred by these state primary schools.
5. Additionally, through a case study approach, this Office aimed to identify potential cost savings that would emerge through the optimization of available resources and student allocation within schools. The four case studies adopted for the purpose of

this exercise are intended to indicate potential solutions and the ensuing economies, which could be achieved through a better matching of resources to the state primary schools' student population.

6. Demographic shifts, and to a lesser extent requests for student transfers between schools, are resulting in a continuously changing demand for state primary school services. While the ageing demographics are resulting in reduced student populations in most villages in Malta, this might not necessarily be the case everywhere due to the internal migration from one village to another, which has seen an increase of population in certain areas. Moreover, the increasing phenomenon of European Union (EU) and International Immigration in recent years has in specific cases led to a saturation of school capacity. This is further exacerbated by the challenges brought forth by cultural, linguistic and other boundaries that need to be overcome to meet the needs of these students without denying the right to a quality education to all.
7. The foregoing contributed to a net decrease in the student population in some localities while other schools are operating at full capacity. However, corrective measures to respond to such changes in demand, thereby effectively redistributing available resources to match student populations, are not always undertaken.
8. The resultant disequilibrium between resources and student populations is not conducive to cost-efficient operations. This is in particular true in view that no additional academic or social benefits seem to emanate from such small classes. To this end, an analysis of the standardized scores achieved by Years 4, 5 and 6 students in the three core subjects revealed that there is no relationship between educational attainment and class size. Other studies, particularly those carried out by the Department for Education and the Audit Commission in the United Kingdom (UK) reached similar conclusions. The foregoing raise sustainability related concerns regarding the current practice of operating a state primary school in almost every town and village in Malta and Gozo.
9. The historical practice of sustaining a state primary school in almost every locality resulted in a number of schools with a relatively low student population, that is, an average class size as low as six students and a school population of 43 students, from Kindergarten 1 up to and including Year 6. Currently, there is no official commitment by the Education Directorates towards an ideal school population. MEDE contends that this is mainly due to the local contextual realities of each particular school.
10. As at scholastic year 2013-2014, 30 out of the 68 state primary schools had a student population below 200. To this end, nine out of 30 such schools pertained to Gozo while the remaining 21 were allocated in Malta. This implies that 37 per cent and 82 per cent of the state primary schools in Malta and Gozo respectively, are operating with a relatively low student population. In these cases, diseconomies of scale become increasingly evident and increase the average operational costs per student.
11. Moreover, the current infrastructural limitations, mainly evident through the limited classroom space, further hinder the Education Directorates from maximizing the utilization of available resources, 94 per cent of which relate to staff emoluments. The National Minimum Conditions for All School Regulations (Subsidiary Legislation 327.12) permit a maximum of up to 30 students, or 26 in cases where there is at least one student with special educational needs, in every Years 1 to 6 classroom. However, in general, the physical space that is available within primary schools does not. To this end, 67 out of the 68 state primary schools have an average class size below that

Declining class size in state primary schools

Limiting factors influencing the number of students per class

Class size rationalization

recommended by these Regulations. According to the minimum space requirements emanating from the same Regulations, the average classroom area in state primary schools, that is, 42 square metres, may accommodate only up to around 19 students. Despite such infrastructural limitations, the opportunity exists in some localities to address excessive spare capacity, particularly in primary schools situated in Gozo, where five out of the 11 schools registered a spare capacity that is greater than 40 per cent. Taking into consideration these five schools only, spare capacity amounted to around 473 students.

12. To date, however, the Education Directorates have not yet carried out comprehensive studies to establish the potential range of commendable size of state primary schools and their respective classes for attaining the outputs expected from this educational service cost-efficiently. Therefore, potential solutions to address the significantly higher operational costs resulting through low populated primary schools are still to be holistically assessed.

13. The Education Directorates' resource management approach generally focused on addressing the needs arising in each school rather than embarking on a national exercise, aimed at rationalizing class sizes across Malta and Gozo. Such studies would identify financial savings arising from the resultant improvements in economies of scale, as well as the opportunity cost associated with underutilized and/or vacated school buildings.

14. In the circumstances, four case studies were examined to compare the prevailing operational costs to the potential class size rationalization alternatives. Such case studies mainly evaluated the potential amalgamation of small schools, for improved economies of scale.

15. These studies revealed that the merging of low populated primary schools is rendered financially viable, solely based on the ensuing operational savings, irrespective of the potential investment required to enable such merger. Case studies revealed that discounted net operational savings are achievable as from the first year, with a maximum payback period of 12 years over a potential initial investment of around €11.2 million for the building of a completely new primary school. The foregoing implies that through school population and class size rationalization initiatives, the Education Directorates would be in a better position to optimize their resource allocation, for improved product delivery.

Overall Conclusions

16. This Report determined that the cost-efficient delivery of state-funded primary school education is subject to a number of conflicting viewpoints. These factors mainly emanate from social and demographic changes, the historical practice of operating schools in almost every town and village, the physical and infrastructural limitations of the current stock of primary schools, as well as other management issues.

17. The retention of primary schools in most localities has been, over many years, the predominant factor considered in the delivery of primary education. This approach has resulted in a number of low student population schools and classes, particularly those situated in Gozo, which push up operational costs. Despite the increased costs of maintaining schools with a low student population, there is no evidence that small class sizes are beneficial to students' academic and social development.

18. Delivering primary education is a complex logistical, technical and financial endeavour. The Education Directorates are aware of the disadvantages associated with relatively small class sizes. To date, however, comprehensive medium to long-term strategies addressing these issues are still in their process of development.
19. Such strategies may imply a paradigm shift from current approaches and possibly a departure from the one-size-fits-all approach that still, to varying degrees, pervades in the educational field, particularly in the state sector. The foregoing implies greater flexibility, which allows construing specifications within a set range of parameters to meet local needs, whilst considering sustainability issues. While evidence supports the claim that a reduced class size is not directly equitable to better student performance, it remains equally important to acknowledge realities where a variety of factors, including but not necessarily limited to socio-economic or special educational needs, would necessitate different classroom arrangements. Within such an intricate environment, it is critical to secure the input and cooperation of all stakeholders.
20. In view of the findings and conclusions highlighted in this Report, the NAO is proposing a number of recommendations. These proposals, generally, consider the strategic and operational levels in relation to class size rationalization within state-financed primary schools.
 - i. The Education Directorates are to further strengthen their monitoring function of demographic and social changes to be in a better position to project future demand for primary school education. Such monitoring and the ensuing evaluations will serve as an input to the development of the Directorates' future strategies relating to class size rationalization, as outlined in recommendation (iii).
 - ii. Comprehensive studies aimed at establishing a potential range for a commendable size of student population within state primary schools and their respective classes, which consider the local contextual realities of such schools, are to be undertaken by the Education Directorates. These studies should consider the multiple inputs to this service, namely in terms of educational, social and financial perspectives. To this end, the Directorates' stakeholders can provide an invaluable contribution.
 - iii. The Directorates are to develop strategies whose objectives comprise class size rationalization. These strategies are to consider the feasibility of operating low populated schools and the optimization of the Directorates' resources. This approach entails reviewing the extent to which it is necessary that the Directorates continue to embrace the historic practice of operating primary schools in most towns and villages.
 - iv. Parallel to the foregoing, the Education Directorates are to develop strategies to optimize the utilization of freed-up resources following class size rationalization exercises, which are sensitive to the diverse realities. One such possibility relates to the ensuing opportunities to further improve the delivery of primary education through enabling more teaching staff to pursue continued professional courses including specialized training.
 - v. Strategies to optimize the use of government-owned properties currently used as primary schools are also to be developed, particularly since these assets constitute substantial financial and social value.

Recommendations

- vi. Class size rationalization initiatives, particularly the potential amalgamation of state primary schools, where feasible, should be realized in phases. Moreover, the first phases are to be closely monitored, to ensure that the expected outcomes, mainly in terms of more cost-efficient operations, as well as the potential benefits to the socio-economic development of students and the community, are in accordance with predetermined educational and financial goals, as well as expectations.
- vii. Consideration is to be given to the extent to which current legislative provisions regarding primary school buildings and class sizes reflect prevailing and future requirements, at least with respect to two issues:
 - a. At the outset, the phrase 'wherever possible' included in the provision stipulating that there should be a primary school in every town and village is to be more clearly defined. To this end, this Office agrees with the broad interpretation given to this phrase in the Education Act (CAP. 327) Article 43(2) by the Education Directorates, where the latter deem that this qualifier encompasses social, educational and financial considerations.
 - b. Secondly, consideration is to be given for reviewing the legal provisions in the National Minimum Conditions for All Schools Regulations (S.L.327.12), outlining the physical parameters of classroom area and space utilization therein. These conditions, which were subject to their last revision over 20 years ago, may not appropriately take into consideration advancements in teaching methods and the increasing use of information technology.
- viii. Infrastructural limitations in a number of schools need to be addressed to enable them to more readily cater for technological developments, and in providing services related to students' psycho-social needs.
- ix. Current practices where a number of primary school buildings in Gozo are concurrently utilized by other governmental entities for activities deemed incompatible with the provision of education, such as stores, local council offices and police stations are to be reviewed. While the immediate benefits of maximizing the use of available buildings are acknowledged, it needs to be ensured that student safety is not compromised.

Chapter 1

Terms of reference

Chapter 1 – Terms of reference

1.1 Introduction

1.1.1 The primary education segment takes up the largest share of the Education Directorates' infrastructural resources, with one or more state primary schools operating in almost every town and village within Malta and Gozo. An ageing population coupled with other demographic shifts are resulting in classrooms with a relatively low number of students. Such circumstances have led to a situation where the primary schools' operational expenses vary significantly from one school to another, ranging from €2,660 to €9,162 per student per year. For the purpose of this Report, the pre-primary levels, that is, Kindergarten 1 and 2 were included in the analysis, as they form an integral part of state primary schools.

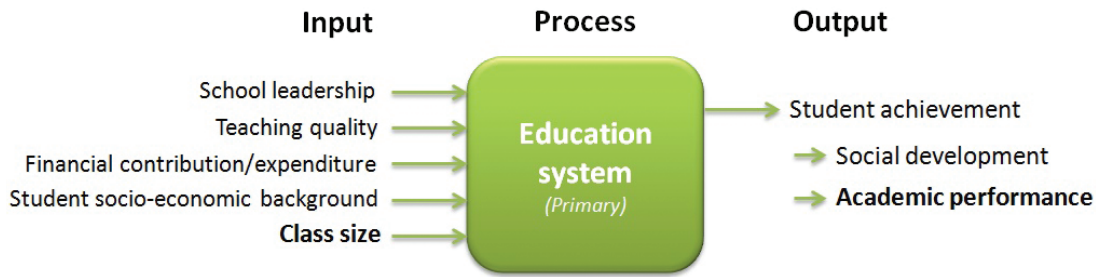
1.1.2 An analysis of national academic results pertaining to Years 4, 5 and 6 students in core subjects revealed that there is no relationship between their educational attainment and the respective class size. Consequently, a classroom with a relatively low number of students is not only uneconomical but does not seem to contribute towards improving students' academic attainment. Additionally, a number of international studies conclude that a significantly smaller class is also detrimental to students' social development.

1.1.3 Against this backdrop, the National Audit Office (NAO) conducted the performance audit: *Class Size in State Primary Schools*. The major aim of this audit was to assess the impact of school and class size on the resources required to sustain cost-efficient operations. The number of students in every classroom constitutes one variable of a number of factors influencing the educational process. Unless otherwise indicated, findings and conclusions presented in this Report reflect the information available as at end 2014.

1.2 The education process is characterized by various inputs and outputs

1.2.1 A number of inputs are required to enable the effective operation of the educational process at primary stage. These mainly include school leadership, teaching quality, students' socio-economic background, class size and the financial contribution or expenditure incurred. Costs primarily comprise staffing, maintenance, transport and other operational expenses. Figure 1 refers.

Figure 1: Education process



Source: Adapted from UK Audit Commission, Value for Money in Schools – Literature and Data Review, Final Report, 27 March 2008.

1.2.2 The students’ achievement, both from a social development point of view as well as from an academic perspective, is the key output of the education process. The output from this process will then contribute to the higher education levels, namely the secondary and tertiary stages. Ultimately, this should enable the realization of the overall goals of the education system, such as the desired literacy and employment rates.

1.3.1 Against this backdrop, this performance audit sought to determine the extent to which:

- i. a strategic and operational framework is in place to enable a potential range of the number of students in state primary school classes, which consider the local contextual realities;
- ii. the number of students in a classroom influences their educational and social development; and
- iii. resources available for the operation of these schools are being utilized cost-efficiently.

1.4.1 The undertaking of this study entailed interviewing key personnel at the Education Directorates within the Ministry for Education and Employment (MEDE). Moreover, the NAO reviewed data and other information pertaining to the scope of this study, maintained in both manual and electronic format. These mainly included data related to student and staff populations, examination scores, infrastructural resources, as well as the respective operational expenses related to the state primary schools under review.

1.4.2 In addition, through a case study approach, this Office evaluated the degree of cost-efficiency achieved by the Education Directorates through their allocation of resources for primary schools operation. To this end, this performance audit comprised four case studies, which aimed to identify potential cost savings, which would emerge through the optimization of available resources and student allocation. The situations assumed by the four case studies do not relate to MEDE’s official policy or position. Their utilization is intended to indicate potential solutions and the ensuing economies, which could be achieved through improving the matching of MEDE’s resources to the primary school’s student population.

1.3 Audit objectives

1.4 Audit methodology

1.5 Report structure

1.4.3 This Report, generally, considered pre-primary levels (Kindergarten 1 and 2) and primary classes (Years 1 to 6) collectively and did not seek to make separate assessments for these grades, mainly due to the following reasons:

- i. Pre-primary levels currently constitute an integral element in the primary school setup of each locality. Consequently, any changes to the current use of the infrastructural resources available to the Directorates¹ would necessitate the re-allocation of all students within the same school building.
- ii. The pre-primary student population makes up 29 per cent of the total student population, and thus absorbs a significant part of operational expenses incurred by each primary school.

1.4.4 However, this approach hindered the determination of cost per student in accordance with their respective category, that is, kindergarten and primary classes. Nevertheless, the evaluations undertaken provided adequately robust indicators to support conclusions reached.

1.5.1 Following this introductory Chapter, the Report focuses on the following key areas:

- i. Chapter 2 highlights the changes in demand for state primary school services over the years. This resulted in a number of localities with a significantly low student population and class sizes.
- ii. Chapter 3 expands on a number of weaknesses with respect to school and class size rationalization. In particular, the limited classroom space in some of the primary schools restricts the maximum number of students and contributes to the cost-inefficient use of available resources.
- iii. Chapter 4 evaluates the extent to which classrooms with a relatively low number of students inflate *per capita* costs. The discussion herein focuses on the four case studies undertaken to evaluate the cost-efficiency of resource allocation within primary schools.

The overall conclusions drawn and recommendations emanating from this audit are included in the Report's Executive Summary on pages 6 to 10.

¹ The terms 'Education Directorates' and 'Directorates' were used interchangeably in this Report.

Chapter 2

Declining class size in state primary schools

Chapter 2 - Declining class size in state primary schools

2.1 Introduction

2.1.1 A number of state primary schools are hosting a significantly low student population and consequently operating small class sizes. This situation is more pronounced in Gozo, where the number of small class size prevails in a substantial proportion of primary schools. In this context, the term 'small' implies a student population that is significantly lower than the maximum permitted by law or the national class size average (refer to Table 1), that is, 30 and 16 students respectively. Moreover, an analysis of the relationship between class size and educational attainment revealed that there are no additional benefits emanating from smaller classes, both in terms of academic performance and social development of students.

2.1.2 In view of the foregoing, this Chapter discusses the following issues:

- i. changes in demand for state primary schools' services, which are resulting in significant variations in class size between localities;
- ii. countermeasures adopted by the Directorates and their effectiveness in attaining an optimal school and class size; and
- iii. lack of academic or social benefits, perceived to emanate from a small class size.

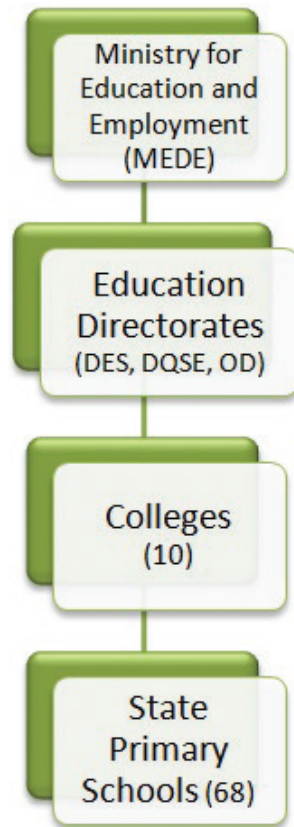
2.2 Class size in primary schools is dependent on the input of a number of players

2.2.1 The Ministry for Education and Employment (MEDE) comprises a number of Directorates, namely the Directorate for Educational Services (DES), the Directorate for Quality and Standards in Education (DQSE) and the Operations Department (OD). Their common goal is to ensure the effective and cost-efficient delivery of the educational service to students.

2.2.2 In 2008, MEDE allocated state primary schools into ten separate colleges thereby introducing an additional administrative layer between the Education Directorates and primary schools. The main aim of this decentralized setup was to optimize operations and to further emphasize the responsibility and accountability of those involved in the educational process of students.² Figure 2 refers.

² Education Act (CAP. 327), Article 51(b).

Figure 2: Organizational structure for state primary schools³



2.2.3 A college principal is responsible for administering each of the ten colleges. This role mainly entails the encouragement of networking and enabling more effective coordination of the schools within the relative college.⁴ To this effect, the college principal is responsible for creating opportunities, which enable heads of schools, teachers and other staff to contribute and exchange ideas, experiences and good practices, as well as to collaborate on common educational programmes.⁵

2.3.1 The total state and non-state primary schools student population in Malta and Gozo has decreased by around 21 per cent, from 40,083 in 2001 to 31,565 in 2009. However, there has been marginal increases since scholastic year 2009-2010. Figure 3 refers.

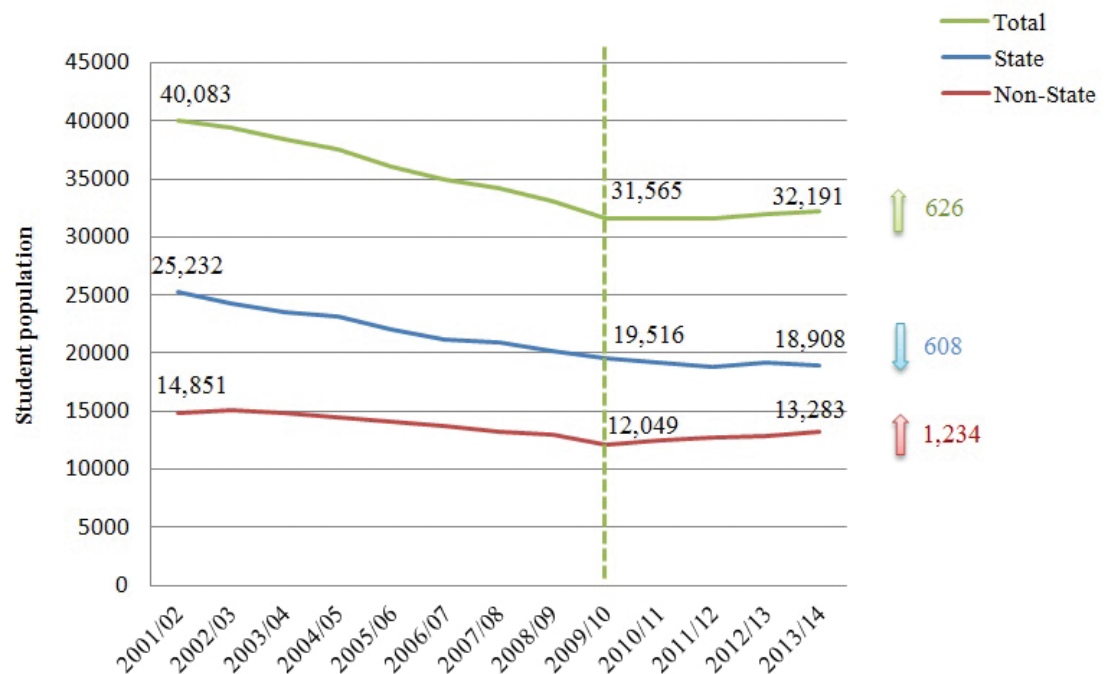
2.3 The demand for primary school services varied over the years

³ Refer to Appendix I for more details regarding the composition of the Education Directorates at MEDE.

⁴ Collective Agreement between the Government and the Malta Union of Teachers, Article 32, pg. 31.

⁵ Education Act (CAP. 327), Article 53(a).

Figure 3: Primary schools' student population (2001 to 2014)



2.3.2 Figure 3 raises the following issues:

- i. The total student population in state and non-state primary schools increased by 626 students between 2009 and 2014. In part, this rise in population is attributable to foreign families settling in Malta, such as for work-related motives.
- ii. The total number of students has been increasing. However, during recent years the student population in state primary schools has decreased by 608, from 19,516 in 2009 to 18,908 in 2014. This constitutes a contraction of three per cent in the student population over this four-year period.
- iii. Concurrently, the student population in non-state primary schools increased by 1,234, as depicted in Figure 3. This situation could be indicative of preferences for Church and independent primary schools, which have absorbed the recent increase in primary school student population.

2.3.3 In the long-term, the demand for primary school education, on a national basis, will be further influenced by two main variables. The first relates to the National Statistics Office projections, which show a declining trend in childbirth from 2015 onwards.⁶ On the other hand, there is evidence of an increasing demand from foreign students for this educational service.

2.3.4 Additionally, the demand for state primary schools is affected by a significant number of requests for school deployment from one school to another. The Directorates receive and process such requests on a regular basis. To this end, the Directorates received 644 'out-of-locality' requests during 2014, of which 93 per cent (599 out of 644) were approved. This situation is in part attributable to changes in residence from one village to another, as well as to work-related needs and the ensuing transport arrangements.

⁶ Children 2010, Valletta: National Statistics Office, 2010.

2.4.1 The National Minimum Conditions for All Schools Regulations (Subsidiary Legislation 327.12), as well as the Agreement between the Government of Malta and the Malta Union of Teachers, define the maximum number of students who may be accommodated in a primary school classroom. The established limits are 15, 20 and 30 for Kindergarten 1, Kindergarten 2 and Years 1 to 6 respectively. In practice, however, in agreement with other stakeholders, this maximum is reduced to 14, 18 and 26 respectively in classes where there is at least one student with special educational needs requiring the support of a Learning Support Assistant. Figure 4 depicts the average class size in state primary schools.

2.4
The average number of students per classroom is significantly lower than the maximum allowed by Regulations

Figure 4: Average number of students per classroom in state primary schools (scholastic year 2013-2014)

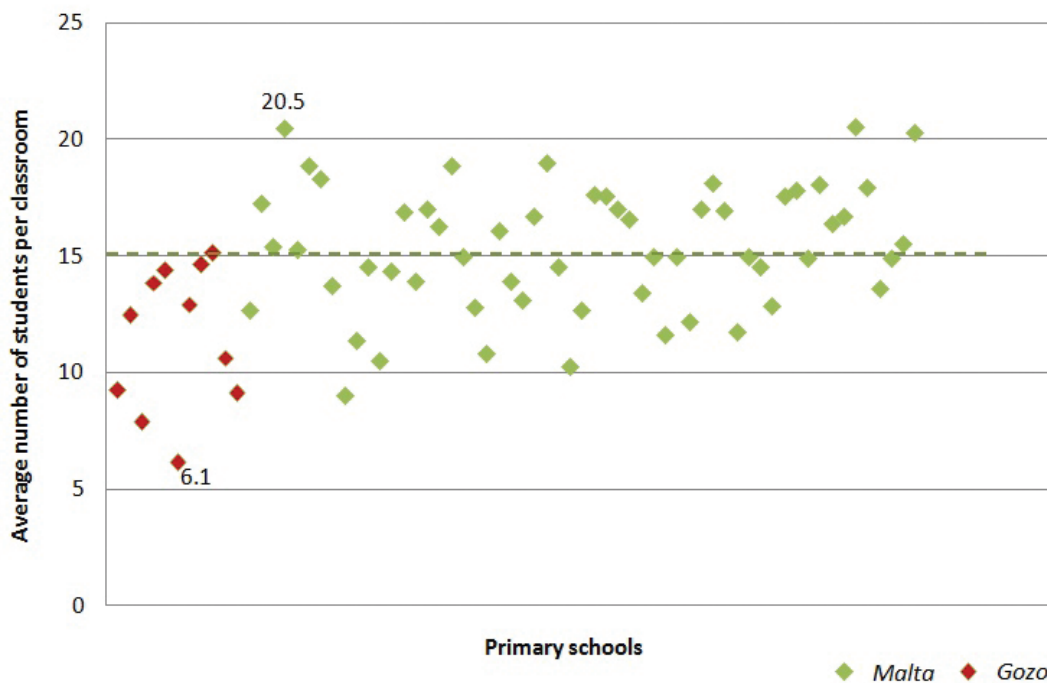


Table 1: Average class size per grade in primary schools (scholastic year 2013-2014)

Grade	Student population	Classrooms	Average class size (students)	Maximum permitted class size by Regulations (students)
Kindergarten 1	2,728	236	12	15
Kindergarten 2	2,719	187	15	20
Years 1 to 6	13,461	785	17	30
Total	18,908	1,208	n/a	n/a
Average	n/a	n/a	16	n/a

2.4.3 Table 1 shows the variances between the maximum permitted number of students per class and the average number of students per class by grade. In addition to demographic shifts, to a certain extent, this situation arises from socio-economic or special educational needs, which is remedied through smaller classes.

2.4.4 Moreover, the variances depicted in Table 1 also arise through infrastructural limitations, where national legislation caps the number of permitted students in each class in accordance with the existing physical dimensions of the building. These infrastructural parameters, mainly relate to classroom space, which limit the maximum number to an average of around 19 students in existing classrooms. Consequently, such a situation hinders the Directorates from reaching the maximum levels permitted by law. Infrastructural limitations will be discussed further in Chapter 3 of this Report.

2.5.1 Pupil-Teacher Ratio (PTR) relates to the number of students divided by the number of teachers. For the purpose of this analysis, teaching staff includes Teachers, Kindergarten Assistants, Learning Support Assistants, as well as Supply, Activity and Peripatetic teaching staff.⁷ Over time, in Malta the PTR decreased significantly from 29 in 1971, to nine students per teacher in 2009.⁸ Figure 5 refers.

2.5.2 As at end of scholastic year 2013-2014, the total teaching staff employed by the Directorates was 2,916, out of which 217 employees were on long-term leave. The student population in primary schools was 18,908, which results in a PTR value of seven. This shows that the overall trend in the ratio of students per teacher is still on the decrease. To this end, it is important to note that such PTR is lower than the EU Member states average of 12.⁹ Matters are slightly further aggravated in Gozo where a PTR value of six was registered. Therefore, a higher proportion of operational costs related to personal emoluments are being incurred for every student in Gozo primary schools.

2.6.1 No additional academic benefits emanate from small classes in state primary schools. To this end, examination results of core subjects were deemed as the most suitable parameter for evaluating the relationship between class size and academic achievement.

⁷ Heads of schools, assistant heads, heads of department, technical and assistant technical officers were not included for the purpose of this analysis. This approach was adopted since these categories of employees are not directly involved in teaching duties.

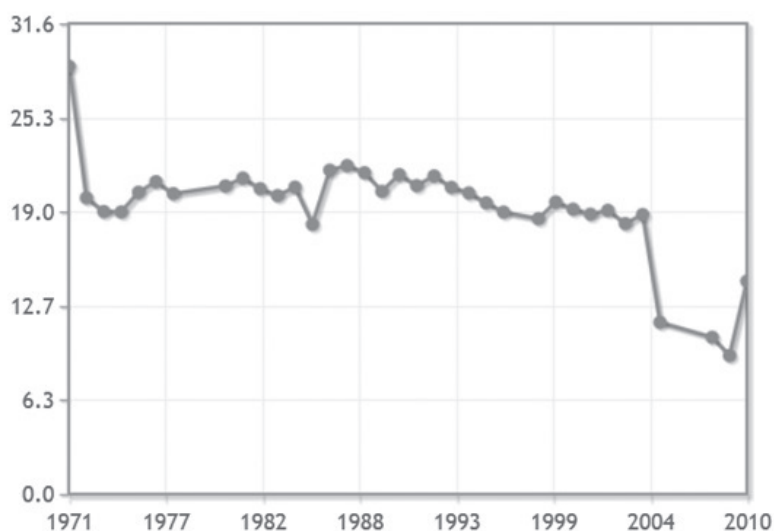
⁸ United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, available at <http://www.indexmundi.com/facts/malta/pupil-teacher-ratio>.

⁹ Source: http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_iste&lang=en

2.5
The pupil to teacher ratio is on the decrease and lower than the EU average

2.6
Smaller class sizes reap no additional academic benefit

Figure 5: Pupil to teacher ratio in primary schools (1971 to 2010)

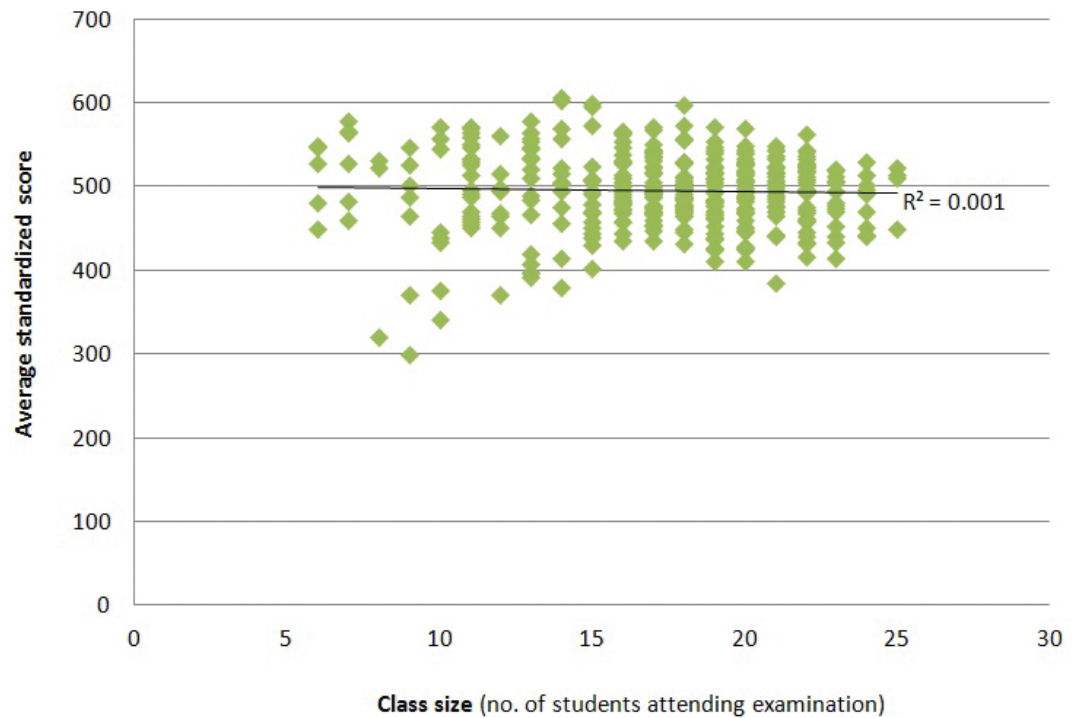


Source: United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics, available at <http://www.indexmundi.com/facts/malta/pupil-teacher-ratio>

- 2.6.2 This approach was adopted since other variables also contribute to the students' academic attainment. These include 'out-of-school' factors and mainly comprise contributory inputs from home or society in general, as well as from private tuition. As noted by the Directorates, the socio-economic background of every student has a significant weighting towards academic achievements. Additionally, academic attainment is also heavily dependent on teaching quality. The foregoing further emphasizes the weak correlation between class size and academic attainment.¹⁰
- 2.6.3 Consequently, this review focused specifically on the relationship between class size and educational attainment. In all state primary schools, the annual examinations are set at a national level. Therefore, the examination papers for Years 4, 5 and 6 students are common across all schools.
- 2.6.4 The Directorates provided the average standardized class scores for Mathematics, English and Maltese attained by Years 4, 5 and 6 students during scholastic year 2013-2014. The standardized scores established a common relationship between individual scores and the resultant mean.
- 2.6.5 The mean and standard deviation of the raw marks of all the students are required to evaluate the standardized score of an individual student, thereby obtaining the *Z-score* of each candidate.
- 2.6.6 The *Z-score* was computed as follows: $Z\text{-score} = (\text{raw mark} - \text{mean mark}) / (\text{standard deviation})$. Finally, the students' *Z-score* was transformed into a standardized score through: $\text{standardized score} = 500 + (Z\text{-score} \times 100)$. The foregoing implies that the mean of all the standardized scores will be 500 and the standard deviation 100. The standardized scores indicate how many standard deviations each score is above or below the mean, thereby enabling a direct comparison of the different subjects.
- 2.6.7 An analysis of these standardized scores revealed that there is no relationship between class size and educational attainment. Thus, although a smaller class size may result in potentially higher individual attention, this does not seem to reflect on the examination results. Figure 6 refers.

¹⁰ The impact of 'out-of-school' factors and teaching quality on academic attainment was beyond the scope of this performance audit.

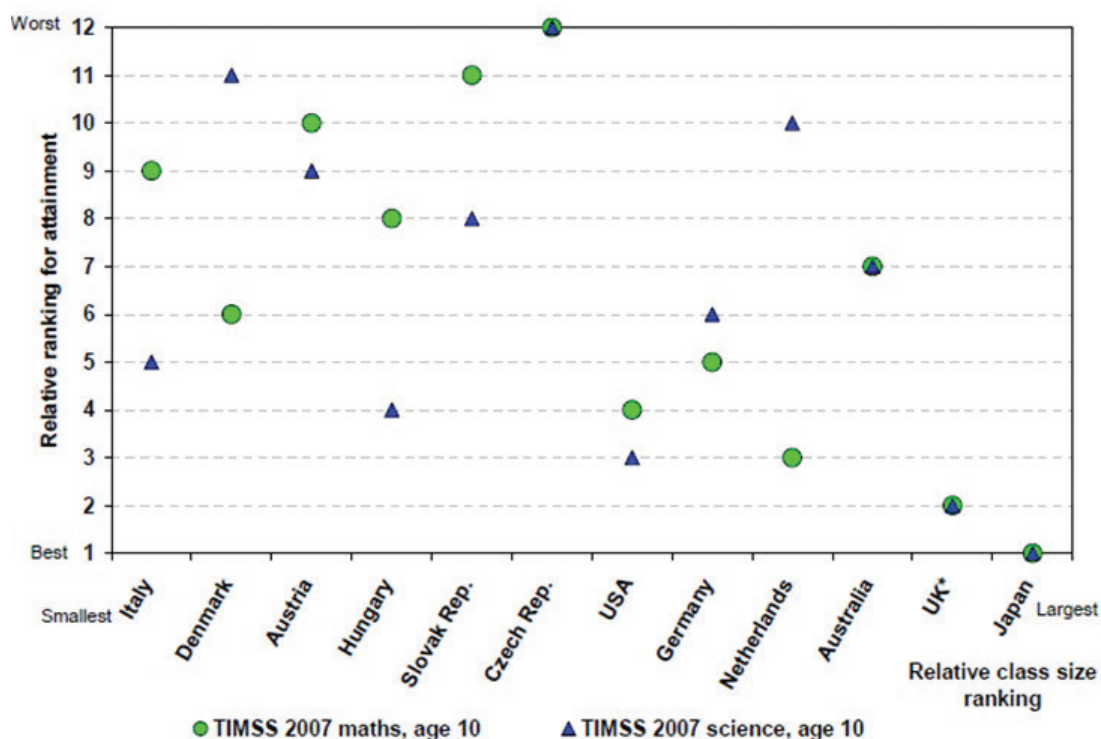
Figure 6: Average standardized score vs class size (2013-2014)



2.6.8 Figure 6 shows that no correlation existed between the average class size and standardized scores attained in the three core subjects analyzed. To this end, Appendix II presents the results achieved by Years 4, 5 and 6 students in the three core subjects, separately. In all cases, no type of association was achieved between these two variables. Therefore, on the basis of the results achieved in 2014, it is evident that academic benefit is not critically dependant on the number of students in a classroom.

2.6.9 The conclusion presented in the preceding paragraph is similar to the one reached by the Department for Education in the United Kingdom (UK), which performed a similar analysis in December 2011. The major objective of this study was to assess the existing evidence relating to class size and educational attainment. The UK analysis noted that although there is no clear relationship between the average primary class size and educational attainment, the best scores were actually achieved by the largest class sizes. For instance, amongst the Organization for Economic Cooperation and Development countries under analysis, UK and Japan had the largest average primary school class sizes and the best scores. This assessment was performed through a representative sample of ten-year-old students from every participating country, assessing the Trends in International Mathematics and Science Studies (TIMSS) results for 2007. MEDE contends, however, that other factors such as socio-economic background and teaching quality may contribute as to why the UK and Japan performed better in spite of having larger class sizes than other OECD countries. Figure 7 refers.

Figure 7: Relationship between class size and, science and mathematics attainment at primary level



Source: Class Size and education in England evidence report, The Department for Education, December 2011.¹¹

2.6.10 The potential benefits arising through a smaller class size was also analysed by the Audit Commission in the UK. This analysis concluded that any benefits that may arise from reduced class sizes are likely to be so small that the cost-effectiveness of such a measure would be questionable.¹²

2.6.11 As contended by the Directorates, a small class size is also unhealthy for the students themselves. This is mainly due to the reduced level of interaction between students of different socio-economic backgrounds.

2.7.1 This Chapter showed that demographic shifts are resulting in a continuously changing demand for state primary school services where a net decrease in the student population of some localities materialized. Moreover, demand for these services is also influenced through requests for student transfer from one school to another. The foregoing issues resulted in most schools in Gozo, and to a much lesser proportion in Malta, operating with a significantly low student population. On the other hand, several schools are operating at their full capacity, in view of the limited classroom space.

2.7.2 The changes in demand, however, are not always countered through timely corrective measures that redistribute available resources to match student populations. The resultant diseconomies of scale associated with low populated schools is not conducive to cost-efficient operations. Matters are compounded as there is no evidence to suggest that additional academic or social benefits emanate from such small classes.

¹¹ UK attainment data refers to England only.

¹² Audit Commission, Value for Money in Schools, Literature and Data Review, Final Report, 27 March 2008, pg. 48.

2.7 Conclusions

To this end, concerns arise on the need for a state primary school in almost every town and village, particularly in situations where the declining student population is more pronounced.

2.7.3 The ensuing Chapter will discuss the effect on class size rationalization due to the historical practice of having a state primary school in almost every locality. Chapter 3 then expands on a number of infrastructural limitations, mainly the limited classroom space, which further contribute to the cost-inefficient use of available resources.

Chapter 3

Limiting factors influencing the
number of students per class

Chapter 3 - Limiting factors influencing the number of students per class

3.1 Introduction

3.1.1 Initiatives to rationalize class size in state primary schools is, to varying degrees, hindered by the historical practice of maintaining a primary school in every town and village. Moreover, most of the buildings currently utilized as primary schools were constructed over 50 years ago and consequently present various physical limitations in terms of the facilities offered as well as their respective student capacity.

3.1.2 Against this background, this Chapter discusses those factors, which together with the demographic issues referred to earlier in this Report, are considered to hinder school and class size rationalization, namely:

- i. strategic concerns related to low student populated primary schools; and
- ii. schools' infrastructural constraints and the relative impact on class size.

3.1.3 Conclusions presented in this Chapter are based on student populations within the respective primary schools as at the commencement of scholastic year 2013-2014, that is 7 October 2013.

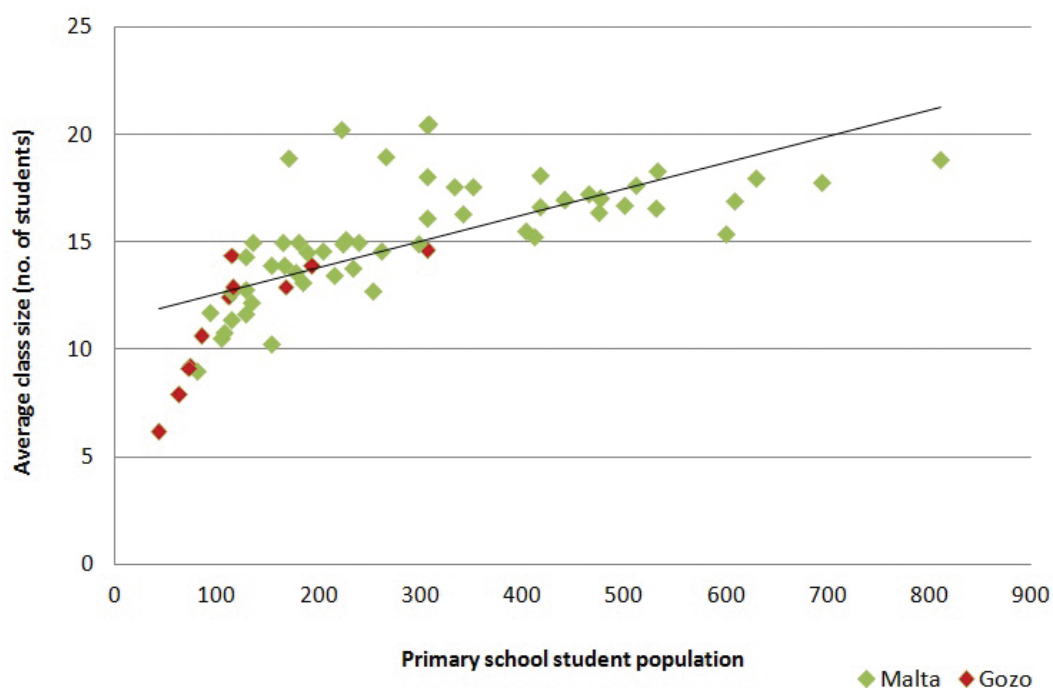
3.2 The quest to operate a state primary school in every locality has historically influenced class size rationalization strategies

3.2.1 Changes in the demand for state primary school services, coupled with the general policy of sustaining a school in almost every locality, has resulted in a number of schools with a relatively low student population. During scholastic year 2013-2014, around 44 per cent (30 out of 68) of the state primary schools had a student population below 200. Such circumstances led to five of these 30 schools operating with an average class size below 10 students, four of which are located in Gozo. Although MEDE is generally not in favour of smaller school and class populations, there is no official commitment towards any ideal size. This is mainly due to the particular circumstances relating to each school and class.

3.2.2 Sustaining a primary school in almost every locality has resulted in an average class size ranging from around six to 21 students. These figures relate to the San Lawrenz and Fgura 'B' Primary Schools respectively. The average class size in state primary schools in Malta and Gozo is 16, which is lower than the European Union (EU) average of 20 students per class.¹³

¹³ The Eurostat data for 2012 was available only for 26 EU Member States, <http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do>

Figure 8: Average number of students per class vs primary school student population (scholastic year 2013-2014)



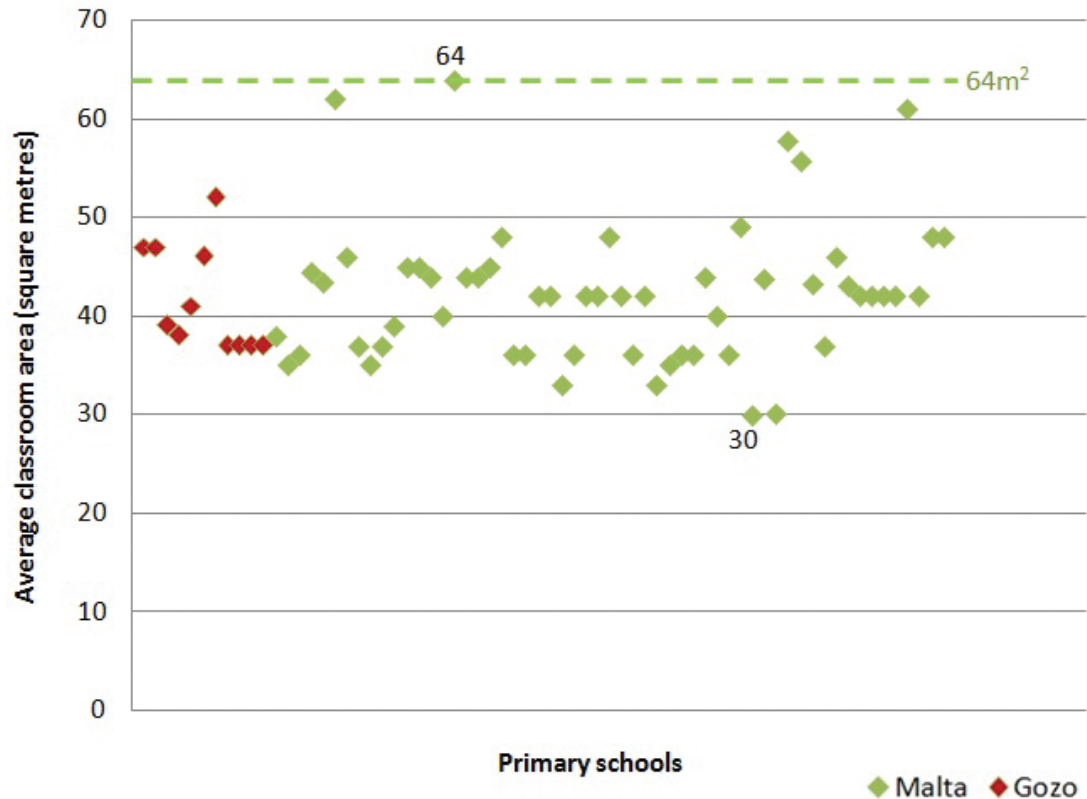
- 3.2.3 As depicted in Figure 8, small classes are generally a characteristic of a low student population within a school. In such instances, diseconomies of scale become increasingly evident and push up the average operational costs per student.
- 3.2.4 To date, the Education Directorates are still to undertake comprehensive studies to establish the potential range of commendable school and class sizes for attaining the outputs expected from this educational service in prevailing circumstances. Potential cost-efficient solutions to address the significantly higher operational costs resulting through low populated primary schools are still to be identified and evaluated. To this end, Cost Benefit Analysis and project appraisal exercises aimed at addressing low student populations or the feasibility of maintaining a primary school in most towns and villages were not performed.
- 3.2.5 The absence of comprehensive strategies and guidelines, to varying degrees, also hinders the Directorates from taking timely and appropriate actions to rationalize class sizes. A case in point relates to the retaining of unmerited low population classes. For instance, 33 classes that were introduced in previous years due to a higher intake of students continued to operate during scholastic year 2013-2014, even though the student population in the respective 20 schools declined. The ensuing extra classes imply that more teaching staff is required to manage the current student population. In turn, this will further increase the operational costs, estimated to be in the region of €697,142.¹⁴

¹⁴ This working was based on the teacher's wage only, as personal emoluments constitute around 94 per cent of operational costs. Moreover, during 2014, a teachers' wage varied from €18,254.02, that is, the minimum of scale 9, to the maximum of scale 7, which is equivalent to €23,997.00. Therefore, the average teachers' wage was assumed €21,125.51.

3.3
 Infrastructural
 limitations
 generally
 hindered more
 effective class size
 rationalization

- 3.3.1 To various extents, school and class size rationalization exercises are hindered by the infrastructural limitations present in a number of primary schools across Malta and Gozo. These physical constraints are primarily attributable to the limited classroom space and become more accentuated when considering that, increasingly, teachers are encouraged to adopt less didactic pedagogies and more interactive experiences that stimulate students. The ongoing technological developments, manifesting themselves in increased Information and Communications Technology in schools, may similarly require a different use of space. Furthermore, societal developments have demonstrated that a number of students require the support of various Psycho-Social Professionals in schools, who require appropriate spaces to operate to ascertain a safe and comfortable environment.
- 3.3.2 Currently, around 76 per cent (52 out of 68) of primary schools have been in operation for over 50 years, with some dating back to 1856. Despite different levels of refurbishment, over the years some of these schools are still not in a position to meet present needs. In the circumstances, the physical constraints presented by the current school stock prohibit the Education Directorates from operating these schools with a higher number of students for more cost-efficient operations.
- 3.3.3 An analysis of the average class dimensions in state primary schools revealed that the average area of a classroom is around 42m², ranging from 30 to 64m². This is around 34 per cent less than the 64m² recommended by the National Minimum Conditions for All Schools Regulations (S.L. 327.12),¹⁵ which came into force in 1991 and defines the spatial requirements for school buildings. Figure 9 shows the estimated average classroom area in each state primary school.¹⁶

Figure 9: Average classroom area in state primary schools

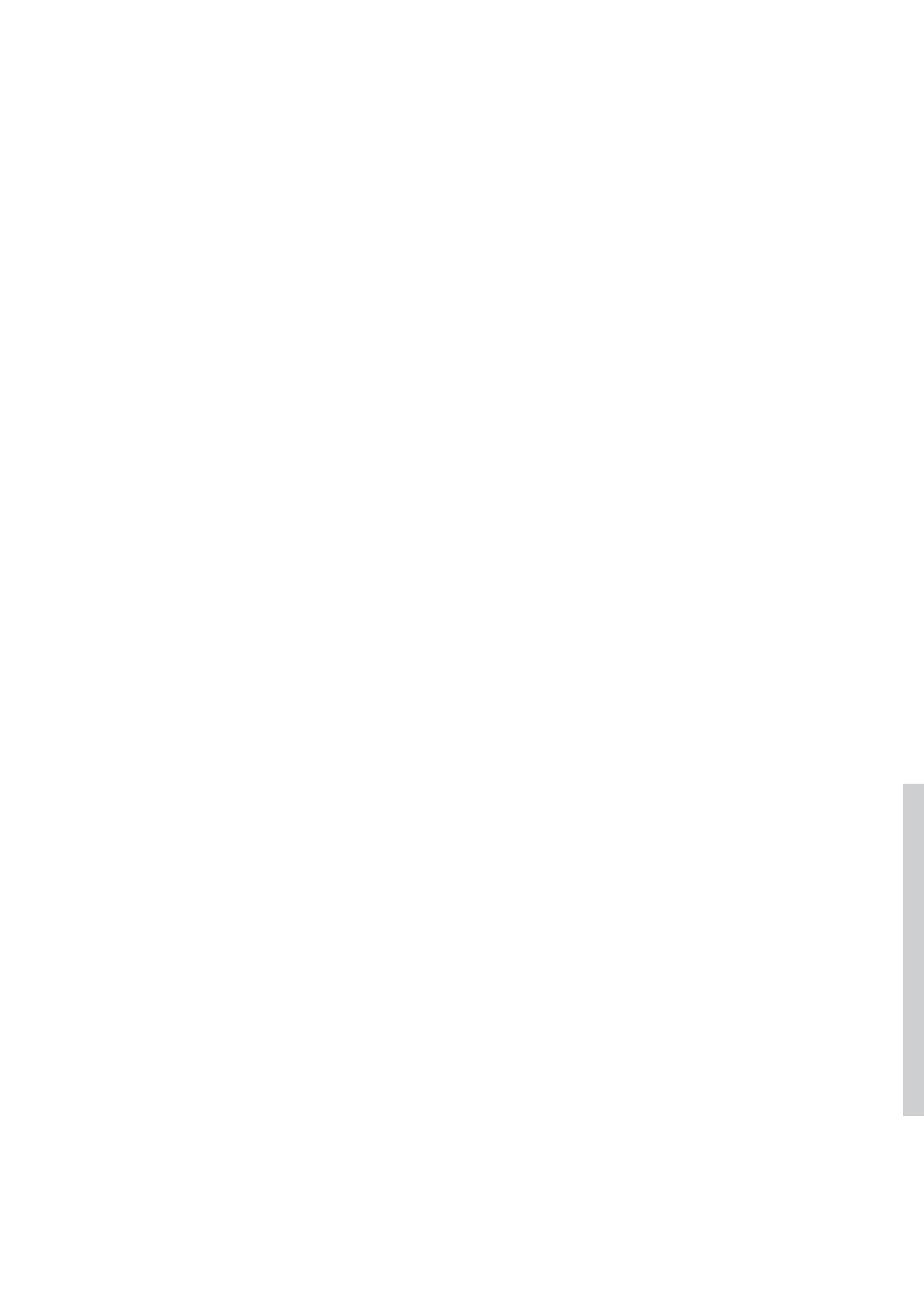


¹⁵ In this case, reference was made to the Maltese version of these Regulations since it supersedes the English version and enables a more accurate interpretation.

¹⁶ Estimates related to average classroom area are solely based on rooms, which were as at October 2013 designated as classrooms. This approach was adopted to minimize the risk of over-estimating school and class size capacity in ensuing analysis presented within this Report.

- 3.3.4 Figure 9 shows that, the average classroom area in 67 out of the 68 state primary schools is less than the optimal size suggested by these Regulations. This implies that due to the current infrastructural limitations, mainly evident through the limited classroom space, the Education Directorates are not in a position to maximize the pupil to teacher ratios permitted by law, hence reducing the operational costs incurred per student.
- 3.3.5 In addition to the classroom size limitations, the Education Directorates' quest to rationalize the number of pupils per class is rendered more complex by other regulatory requirements – which intrinsically promote the school environment as well as health and safety considerations. The legal notice referred to previously stipulates that a minimum classroom space of 1.5 square metres is to be available for every student, a two metres wide border is to be allocated as teachers' space and a minimum playground space of five square metres per student. This situation places stringent restrictions on the Education Directorates in utilizing the existing buildings since these Regulations cap the student population in each school and the respective classes.
- 3.3.6 Addressing this infrastructural limitation, that is, small classrooms, in many cases would necessitate varying levels of investment. The Luqa Primary School project, completed in 2005 illustrates this point. This upgrading project necessitated an expenditure of over €2.3 million. Such project comprised a completely new second floor, with classrooms enlarged by approximately 33 per cent. Nonetheless, the new classrooms are still on average 16 square metres less than the standard size suggested by the Regulations, as referred to in paragraph 3.3.3.
- 3.3.7 A more recent infrastructural development, namely the Pembroke Primary School, completed in September 2009, complies with the aforementioned classroom specifications. Therefore, each classroom is capable of accommodating a larger number of students, to exploit the benefits emanating from economies of scale, without conceding any health and safety related criteria.
- 3.4.1 This Chapter identified gaps in comprehensive strategies as well as the infrastructural constraints associated with the current stock of state primary schools as the major variables prohibiting the undertaking of more class size rationalization initiatives.
- 3.4.2 The historical practice of sustaining a school in almost every locality has resulted in a number of schools with a relatively low student population, particularly in Gozo. In these cases, diseconomies of scale become increasingly evident and increase the average operational cost per student.
- 3.4.3 In addition, the current infrastructural limitations, mainly evident through the limited classroom space, further hinder the Education Directorates from maximizing the pupil to teacher ratios permitted by law, for more cost-efficient operations. Despite these constraints, prolonging the issue to deal holistically with the problem of low populated schools is a costly endeavour, which hinders the Education Directorates in making the optimal use of their resources.
- 3.4.4 The next Chapter of this Report discusses the resultant variations in operational costs arising from different school and class sizes. To this end, four case studies will further highlight the potential cost savings, attainable through class size rationalization, mainly by the amalgamation of a number of primary schools.

3.4 Conclusions



Chapter 4

Class size rationalization

Chapter 4 – Class size rationalization

4.1 Introduction

4.1.1 Smaller class sizes are conducive to diseconomies of scale, which ultimately inflates costs related to the running of primary schools. Within this context, the question arises as to whether it remains feasible to operate a state primary school in almost every town and village across Malta and Gozo. To date, however, the Education Directorates have not embarked on comprehensive financial evaluations of the various options available to address issues arising from low populated primary schools. MEDE's initiatives have mainly focused on the building of new schools to address excessive demand in some localities. These projects relate to the recently constructed primary school in Pembroke, while similar initiatives are planned at Marsaskala and St. Paul's Bay.

4.1.2 This Chapter aims to discuss the extent to which the number of students per class impacts on the cost-efficient operation of primary schools. Towards this end, the ensuing Sections of this Chapter address three main issues, namely the:

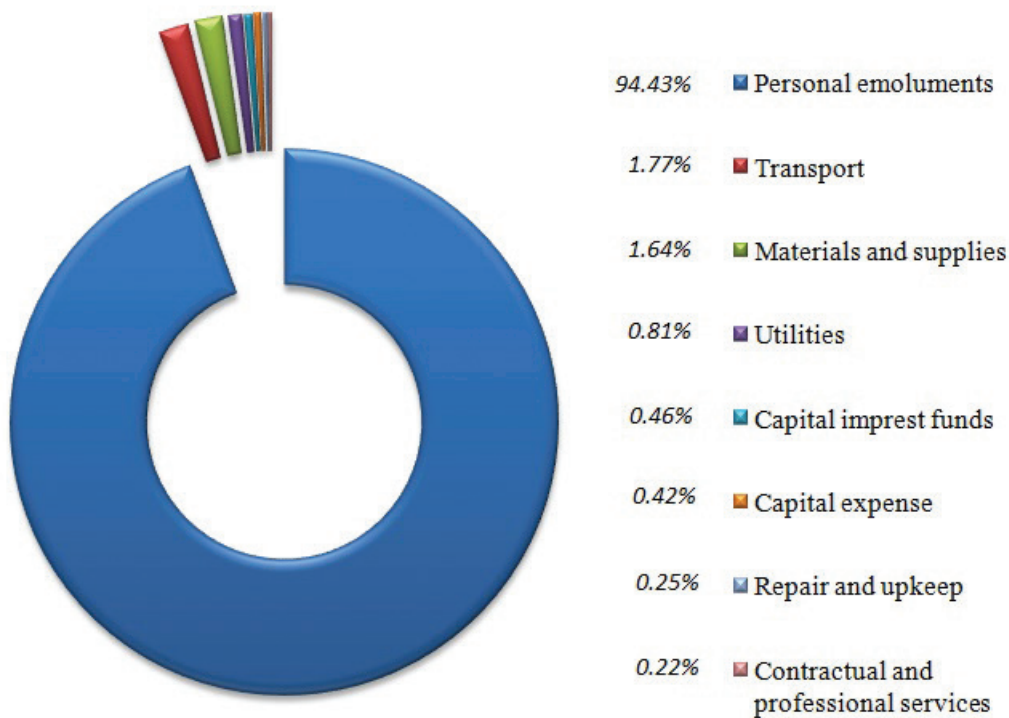
- i. resultant variations in operational costs arising from different school and class sizes;
- ii. cost-efficient utilization of infrastructural resources available to the Education Directorates; and
- iii. identification of potential cost savings through four case studies.

4.2 State primary schools' annual operating expenditures amounted to €68 million

4.2.1 During scholastic year 2013-2014, the total expenditure for the operation of primary schools, including the pre-primary levels, amounted to over €68 million. Around 94 per cent of these costs were attributable to personal emoluments of teaching and non-teaching grades. Figure 10 refers.

4.2.2 The situation depicted in Figure 10 shows that the service provided by the educational sector is predominantly human resource intensive. During the period under review, 3,537 members of staff were employed in primary schools. Within a primary school set-up, apart from teaching staff, additional support employees contribute towards the daily management of primary schools. These include heads of schools, assistant heads and other administrative and support staff, which constitute around 18 per cent of the total staff complement.

Figure 10: Expenditure in primary schools (scholastic year 2013-2014)



Source: MEDE

4.2.3 The remaining costs related mainly to transport, materials and supplies, as well as utilities. These constituted 1.77, 1.64 and 0.81 per cent respectively. In total, these three elements amount to around €2.88 million.

4.3.1 This study has revealed that the average operational cost per student varies significantly from one state primary school to another. During the period under review, this disparity ranged from €2,660 to €9,162 per student. The former value relates to a primary school with a population of 477 and an average class size of 17 students, while the latter pertains to a school population of 43 and an average class size of six students. Moreover, the highest average operational costs per student were mostly recorded in Gozo. Figure 11 refers.

4.3.2 Figure 11 clearly shows that as the number of students in a primary school increases, the average operational cost per student is lowered. Given that there are no adverse effects on the overall students' achievement as noted in paragraph 2.6.1, the foregoing implies that, in some cases, particularly in Gozo, current practices are not leading to the optimal allocation of available resources. In such circumstances, cost inefficiencies materialize. The wide-ranging differences in the operational costs per student is mainly attributable to economies of scale, which favour schools with a larger student population.

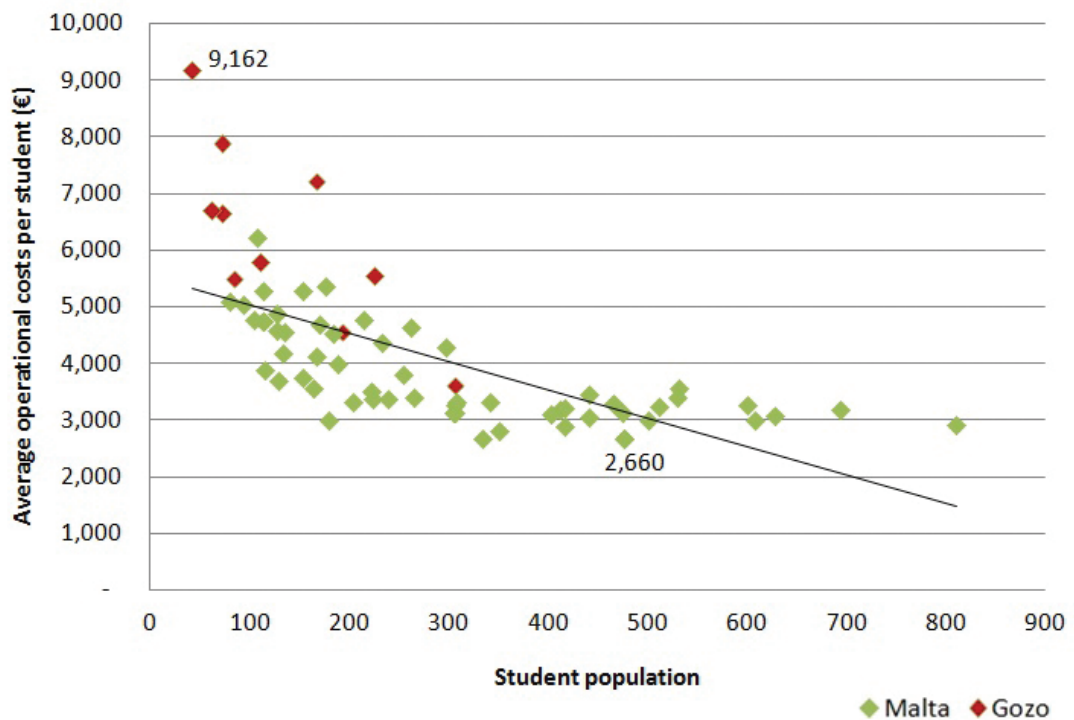
4.4.1 Diseconomies of scale and the resultant higher annual cost per student, in part, result through the underutilization of some of the state primary schools' infrastructure. Appendix III shows the spare capacity, which was available in a number of state primary schools in Malta and Gozo during scholastic year 2013-2014.¹⁷

¹⁷ The spare capacity calculations were based on the average classroom space available in each state primary school.

4.3
Operational costs per student increase significantly for smaller schools

4.4
In some cases, state primary school buildings are not being fully exploited

Figure 11: Primary school student population and the respective average operational costs per student (scholastic year 2013-2014)



4.4.2 Through a desk review of available documentation, a number of primary schools were selected for a preliminary assessment of the school buildings' utilization. These schools were mainly chosen due to their relatively small student population and their proximity to each other. These included the Luqa, Gudja, San Lawrenz and Għarb Primary Schools.

Luqa Primary School is not operating to its maximum capacity despite substantial investment

4.4.3 During 2001 to 2005, an infrastructural investment of over €2.3 million was carried out at the Luqa Primary School, which enabled its student capacity to increase from around 182 to 404. The project was completed in different phases, and mainly included the construction of a new floor, hall, football pitch and other ancillary facilities. The current classrooms are 33 per cent larger as a result of the structural works. Moreover, the classroom area within the school has increased as well, from 470 square meters to 1,045 square meters.

4.4.4 Despite such a substantial investment, the Luqa Primary School is still not being fully utilized. During scholastic year 2013-2014, the school was operating at around 37 per cent below its student capacity, that is, this school can accommodate a further 150 pupils. This situation is attributable to various factors, such as the declining student population within Luqa and the current practice of operating primary schools in most towns and villages.

Opportunities to better utilize the Gudja Primary School area have not been exploited

4.4.5 During scholastic year 2013-2014, the Gudja Primary School accommodated 81 students, which is 44 per cent below its maximum capacity of 145 students. In such circumstances, the annual operating cost per student at this school was estimated at €5,088 or 41 per cent higher than the national average operational cost of €3,602 per student per annum.

The excess areas at San Lawrenz and Għarb Primary Schools are currently being utilized for non-educational related services

- 4.4.6 Throughout recent years, the student population of a number of state primary schools in Gozo declined. San Lawrenz and Għarb Primary Schools, amongst others, are currently operating with a significantly low student population, namely 43 and 74 respectively. On the basis of the respective available footprint, these schools are capable of handling a total student capacity of around 150 and 170 respectively.
- 4.4.7 The low student populations in these schools are considered as the main reason, which inflate the average student operational costs to €9,162 and €6,643 annually. These costs amount to 154 and 84 per cent higher respectively, than the national average cost per student in state primary schools of €3,602.
- 4.4.8 Due to declining students' population, some of the school buildings in both the San Lawrenz and Għarb Primary Schools have been rendered surplus to requirements. This has effectively resulted into different areas being utilized for other non-educational related services such as the local council offices, police stations, stores and others. In San Lawrenz and Għarb, around six and 17 per cent of the total school area respectively is currently being utilized for these non-educational related services.
- 4.5.1 In view of the foregoing, this performance audit sought to determine the extent to which the Education Directorates were exploiting opportunities to optimize class sizes, which would ultimately translate into financial savings on current operational costs. This exercise was rendered more complex and laborious due to the limited availability of relevant data on the subject matter. Such a situation mainly materialized since the Education Directorates are still to embark on comprehensive financial evaluations of the various options available for optimizing class sizes. To date, the Directorates' resource management approach generally focused on addressing the needs arising in each school rather than embarking on a national exercise that is aimed to rationalize class sizes across Malta and Gozo.
- 4.5.2 The Education Directorates have not yet undertaken comprehensive studies to assess the possibility of amalgamating primary schools, particularly the ones with a very small student population. Such studies would have proposed potential solutions, identifying financial savings through the resultant improvements in economies of scale, and the opportunity cost associated with vacant and/or underutilized school buildings.
- 4.5.3 In the circumstances, through four case studies, this performance audit sought to compare prevailing operational costs to potential class size rationalization alternatives. The four case studies adhere to one or more of the following selection criteria:
- i. primary schools with a relatively low student population, implying a higher probability of cost-inefficient operations;
 - ii. located in close proximity to each other, thereby minimizing the impact on transport; and
 - iii. relatively old schools, which may require a new infrastructural investment.

4.5
Four case studies highlight the feasibility of merging low student population primary schools

4.5.4 For the purpose of this performance audit, the alternatives to potential class size rationalization solutions were chosen from multiple possible permutations on the premise that they provide a benchmarking opportunity of current operational costs. The approaches adopted constitute practical examples – and should be interpreted as such – of how significant savings could result through the better utilization of classrooms. In practice, detailed studies would need to be undertaken by the Education Directorates to determine which solutions constitute the best option in any given circumstance. Table 2 outlines the approaches adopted in the four case studies.

Table 2: Case studies reviewed by NAO to optimize class size utilization

Case Study	Description
1	Transferring Gudja student population to Luqa Primary School
2	Transferring Ghaxaq student population to Gudja Primary School
3	Transferring San Lawrenz student population to Għarb Primary School
4	Building of a new school in Gozo and amalgamating the student populations of Għarb, San Lawrenz, Kerċem, Xewkija and Żebbuġ Primary Schools

4.5.5 The main thrust of the approaches adopted in the four case studies depicted in Table 2 entails the amalgamation of student populations, which are currently accommodated in primary schools at various localities. These exercises mainly identified operational costs reduction opportunities over a number of years through the merging of schools.

4.5.6 Furthermore, the four case studies considered various investment scenarios, which may be required to enable the amalgamation of student populations from various localities into a single primary school. The assumed scenarios ranged from marginal to the capital investment estimated to be required for the construction of a new school.

4.5.7 Towards this end, the exercise considered a number of assumptions and limitations as follows:

- i. It was assumed that the opportunity cost of the vacant primary school amounted to €600 per square meter of land. This estimate, which is based on the recent sale of garages by the Housing Authority, is considered as conservative when compared to the current market values.
- ii. The estimated operational cost savings utilised in the four case studies analysis undertaken were based on the average operational costs incurred by primary schools with a similar population within a range of plus or minus 50 students. The limitation of this approach is that it retains any inherent inefficiency present within the primary schools considered for the extrapolation of average operational costs.
- iii. The additional transport costs which would be incurred due to the transferring of students from one locality to another following the potential amalgamation of schools were assumed as double the current average cost per student.
- iv. Projected operational costs were adjusted by the Cost of Living Index. This was assumed to be two per cent based on European Central Bank projections.
- v. The yearly savings in operational costs resulting through the amalgamation of the selected schools' populations were subjected to a discount rate of four per

cent throughout a lifetime of 25 years. This rate was selected in accordance with European Commission guidelines.

- vi. The assumed infrastructural investment required to enable construction works to be undertaken, which in turn would increase student capacity in the selected schools ranges from €1 million to €4 million. Such an assumption was mainly based on information available with respect to works carried out by the Foundation for Tomorrow's Schools to refurbish, upgrade or build a completely new primary school.
- vii. For the purpose of this exercise, any implication related to the amalgamation of primary schools from different colleges, such as changes in students' uniforms, were not taken into account.

4.5.8 As outlined in the previous Section, despite the substantial investment, the Luqa Primary School still has around 37 per cent of spare capacity, which implies it can accommodate 150 more students. On the other hand, during scholastic year 2013-2014, the Gudja Primary School had a school capacity of 81 students. The foregoing implies that, on the basis of financial considerations, the opportunity exists to amalgamate the Gudja and Luqa Schools by transferring the student population of the former to the latter primary school. Table 3 refers.

Table 3: Cost savings through accommodating the current Gudja School population at Luqa Primary School

Discounted net operational savings in first year (based on the operational cost of nine similarly sized schools where the collective average cost per student amounts to €3,266)	€251,876
Additional transport costs in first year (emanating from the transferring of students from the Gudja to Luqa Primary School)	€20,691
Opportunity cost of the resultant vacant Gudja Primary School (comprising a footprint of 3,165 square metres at an assumed value of €600 per square metre)	€1,899,000
Cumulative net present value after 25 years (which considers a discount rate of four per cent and an annual inflation rate of two per cent)	€6,936,067

4.5.9 This exercise has revealed that, without additional capital investment, the Luqa Primary School's spare capacity can be utilized to accommodate the 81 students attending the Gudja Primary School. The major outflows, in terms of additional expenditure, associated with this move mainly relate to the ensuing additional transport costs. However, the financial savings emanating through improved economies of scale as well as the opportunity costs associated with the resultant vacant property at Gudja renders the amalgamation of the Gudja and Luqa Schools a financially advantageous venture. This is evidenced by the positive cumulative Net Present Value (NPV) of around €6.9 million over a 25-year period.

*Case study 1:
Amalgamate
schools without any
additional
infrastructural
investment*

4.5.10 The scenario depicted in the above caption, by Case study 2, relates to the potential amalgamation of the Ghaxaq and Gudja student populations into the latter school. Following its consideration in the previous case study, the featuring of the Gudja Primary School in this case study further illustrates that there are a number of potential solutions available for any given circumstance. For the purpose of Case Study 2, the Gudja Primary School was selected to host the potential merged school population on account that the current school set-up seems to lend itself better to such a project.

4.5.11 Determining the feasibility of this potential amalgamation entailed considering a range of investment costs from €1 million to €3 million. This potential investment would be required to fund construction works at the Gudja Primary School to enable it to accommodate more students in accordance with legislative parameters. The range of investment costs also considers overheads, which would be incurred during the construction phase of this project.

Table 4: Viability of merging Gudja and Ghaxaq Primary Schools based on a range of investment costs

Estimated investment cost	€1 million	€2 million	€3 million
Discounted net operational savings in first year (based on the operational cost of ten similarly sized schools where the collective average cost per student amounts to €3,278)	€331,330	€331,330	€331,330
Additional transport costs in first year (emanating from the transferring of students from Ghaxaq to Gudja Primary School)	€59,774	€59,774	€59,774
Opportunity cost of vacant Ghaxaq Primary School (comprising a footprint of 3,300 square metres at an assumed value of €600 per square metre)	€1,980,000	€1,980,000	€1,980,000
Cumulative net present value after 25 years (which considers a discount rate of four per cent and an annual inflation rate of two per cent)	€7,606,006	€6,606,006	€5,606,006

4.5.12 Table 4 shows that the potential merger of the student populations of Ghaxaq and Gudja, would be a financially viable project even when considering an investment of up to €3 million to enable the latter school to accommodate more pupils. This scenario was confirmed through the positive NPV over a 25-year period, which, in part, is attributable to the opportunity cost arising from the resultant vacant property at Ghaxaq.

4.5.13 Another significant contribution towards the project's positive NPV is evidenced through the operational cost savings, which can be achieved by merging the two schools. Prior the potential merger, the total operational costs of the two schools amounted to €1,437,029, where the cost per student at the Ghaxaq and Gudja Schools were estimated at €4,380 and €5,088 per student annually respectively. Upon

amalgamating the two schools, the combined operational costs for 315 students amounted to around €1,032,672, which implies that the average annual cost per student would amount to €3,278.

4.5.14 Case study 3 also portrays a situation where neighbouring schools with low student populations may be amalgamated. The case study considered the potential merging of the San Lawrenz and Għarb Primary School populations by transferring the 43 students¹⁸ accommodated at the former to the latter. The Għarb Primary School was considered for potentially accommodating the merged student populations on the basis of a significantly larger footprint than the San Lawrenz School.¹⁹

4.5.15 The merging of the two schools would result in a total student population of around 117 students.²⁰ This case study also assumed an investment ranging from €1 million to €3 million. This capital expenditure would be required to fund the necessary construction works to enable Għarb Primary School to accommodate the increased student intake.

Table 5: Viability of merging San Lawrenz and Għarb Primary Schools based on a range of investment costs

Estimated investment cost	€1 million	€2 million	€3 million
Discounted net operational savings in first year (based on the operational cost of 21 similarly sized schools where the collective average cost per student amounts to €4,790)	€302,082	€302,082	€302,082
Additional transport costs in first year (emanating from the transferring of students from San Lawrenz to Għarb Primary School)	€10,984	€10,984	€10,984
Opportunity cost of vacant San Lawrenz Primary School (comprising a footprint of 4,681 square metres at an assumed value of €600 per square metre)	€2,808,600	€2,808,600	€2,808,600
Cumulative net present value after 25 years (which considers a discount rate of four per cent and an annual inflation rate of two per cent)	€7,849,693	€6,849,693	€5,849,693

4.5.16 Table 5 shows that economy of scale related benefits materialize when these two schools with a low student population are merged. The positive NPV over the projects' assumed lifetime of 25 years confirms the feasibility of such a project. Moreover, the figures noted in Table 5 also reaffirm that the current practice of operating schools with low student populations inflates operational costs.

4.5.17 To this end, the discounted net operational savings in the first year following the potential transfer of students from the San Lawrenz to Għarb Primary School are estimated at around €302,082. This implies that the annual cost per student in the amalgamated situation would now amount to €4,790, as opposed to the current costs of €9,162 and €6,643 incurred by San Lawrenz and Għarb Primary Schools respectively.

¹⁸ As per commencement of scholastic year 2013-2014.

¹⁹ In practice, the conclusions of this exercise would be similar if the San Lawrenz Primary School was considered for accommodating the amalgamated student populations.

²⁰ The 117-student population is composed of 43 and 74 students in the San Lawrenz and Għarb Primary Schools respectively as per commencement of scholastic year 2013-2014.

*Case study 4:
Amalgamation of a
number of small
primary schools
through the
building of a
new school*

4.5.18 The fourth case study considered the potential building of a new primary school in Gozo to amalgamate five low populated primary schools, namely San Lawrenz, Għarb, Kerċem, Xewkija and Żebbuġ. The new school would be expected to cater for around 338 students.²¹

Table 6: Viability of amalgamating five small primary schools in Gozo into one newly built school

Estimated infrastructural development cost	€4,000,000
Estimated cost of purchased land for building new primary school²² (comprising a total footprint of 7,679.58 square metres as per Pembroke Primary School at an assumed value of €941 per square metre)	€7,226,485
Discounted net operational savings in first year (based on the operational cost of nine similarly sized schools where the collective average cost per student amounts to €3,266)	€1,113,216
Additional transport costs in first year (emanating from the transferring of students from San Lawrenz, Għarb, Kerċem, Xewkija and Żebbuġ, to the new primary school)	€86,341
Opportunity cost of the five vacated primary schools (comprising a total footprint of around 24,833.25 square metres at an assumed value of €600 per square metre)	€14,899,950
Cumulative net present value after 25 years (which considers a discount rate of four per cent and an annual inflation rate of two per cent)	€25,935,801

4.5.19 The estimated infrastructural development cost of €4 million for the potentially newly built school in Gozo was based on the circa €3.6 million expenditure incurred with respect to the recently constructed primary school at Pembroke and taking into consideration any other inflating costs to date. The project's viability becomes more pronounced when considering an opportunity cost of around €14.9 million emanating from the ensuing vacant government-owned property pertaining to the five primary schools.²³

4.5.20 Additionally, the amalgamation of five small primary schools in Gozo resulted in substantial operational savings. The discounted net operational savings during the first year following the merging amount to around €1,113,216. Such savings materialize

²¹ The 338 students are composed of the school student populations of San Lawrenz, Għarb, Kerċem, Xewkija and Żebbuġ for scholastic year 2013-2014.

²² This cost can be excluded if MEDE is able to make use of land and properties under its responsibility.

²³ In determining the opportunity cost of the five potentially vacated primary schools, consideration was given to instances where other services are being provided within the same building.

since the current operational costs of the five schools, amounting to €2,347,969 would decrease to an estimated €1,190,225 on the project's commencement (Table 7 refers).

Table 7: Potential operational costs savings through the merging of five low populated primary schools

Primary school	Total operational costs (€)	Student population	Operational costs per student (€)
Għarb	491,576	74	6,643
San Lawrenz	393,966	43	9,162
Kerċem	421,583	63	6,692
Xewkija	466,843	85	5,492
Żebbuġ	574,001	73	7,863
Total (2013-2014)	2,347,969	338	6,947
Estimate operational cost of the potential new primary school during first year of operation (amalgamation of five schools)	1,190,225*	338	3,521
Potential operational savings (during first year of operation)	1,157,744	n/a	n/a
Discount rate of four per cent (during first year of operation)	0.9615	n/a	n/a
Discounted potential net operational savings (during first year of operation)	1,113,216	n/a	n/a

* Based on the average operational costs incurred by other primary schools with a similar student population and including additional transport costs.

4.5.21 Table 7 clearly shows that the current practice of retaining low population primary schools in Gozo leads to higher operational costs through the prevailing diseconomies of scale disadvantages. To this end, the cost of maintaining the status quo amounts to around €1.1 million annually.

4.6.1 The four case studies show that the merging of low population primary schools is rendered financially viable, solely on the basis of the ensuing operational savings. This scenario materialized irrespective of the potential investment required to enable the merging of low population schools. Table 8 shows the payback period in years on discounted operational savings in accordance with the potential investment.

4.6
On the basis of operational savings, the merging of low population schools is financially feasible

Table 8: Payback periods of potential investment solely through net operational savings

Estimated investment cost	€0	€1 million	€2 million	€3 million	€4 million
Case study 1:					
Transferring Gudja student population to Luqa Primary School	Year 1	n/a	n/a	n/a	n/a
Case study 2:					
Transferring Ghaxaq student population to Gudja Primary School	n/a	Year 4	Year 7	Year 10	n/a
Case study 3:					
Transferring San Lawrenz student population to Għarb Primary School	n/a	Year 4	Year 8	Year 11	n/a
Case study 4:					
Building of a new school in Gozo	n/a	n/a	n/a	n/a	Year 12*

* Apart from the estimated investment cost of €4 million, an additional €7.2 million relating to the estimated cost of the purchased land for building a new primary school was also taken into consideration.

4.6.2 Table 8 provides robust indications that solely on the basis of operational savings, the merging of low population schools with the main objective of rationalizing class sizes is financially feasible. This implies that the viability of such projects would be more pronounced if the opportunity cost, equivalent to the value of the vacated school buildings, would be considered, as has been noted in the preceding Section.

4.6.3 To this end, Table 8 shows that paybacks on potential investment range from one to 12 years. This is deemed as a favourable payback period when considering a project lifetime of around 25 years. The foregoing implies that through school populations and class size rationalization initiatives, the Education Directorates would be in a better position to optimize their resource allocation, which will ultimately enable the Directorates to improve further their product delivery.

4.7 Conclusions

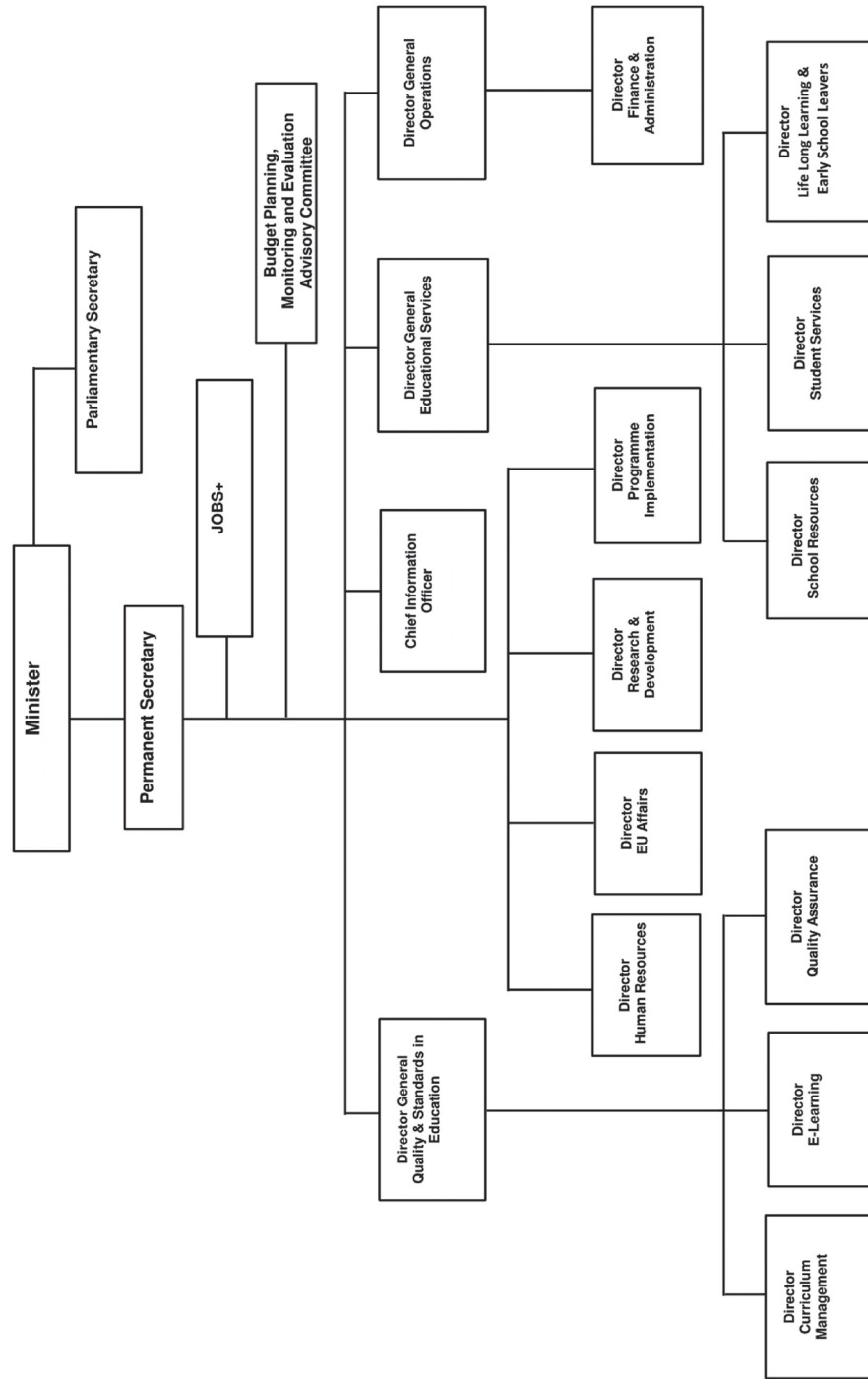
4.7.1 The overall decline in student population, coupled with a forecasted decrease in childbirth, questions the need for a primary school in almost every locality in Malta and Gozo. The additional resources consumed by relatively small schools and the respective classes within, primarily due to diseconomies of scale, could be better utilized to meet other needs within this invaluable sector.

4.7.2 Article 43(2) of the Education Act (Cap. 327) relates to the provision of primary education and states that ‘... the Minister shall wherever possible maintain a school in every town or village and shall provide transport for pupils who reside in areas which are distant from the school’. The spirit of this legislative provision, particularly the term ‘wherever possible’, is deemed to include financial viability. To this end, the Directorates allocate a similar broad interpretation.

4.7.3 The analysis presented in this Chapter raises concern on the financial feasibility of class sizes with a small number of students’, compared to the national average and maximum permitted class size in terms of national regulations on class sizes. In Malta and Gozo there are 42 and 91 per cent of schools, whose average class size is below 15 students. This Chapter, through a number of case studies, has highlighted that maintaining primary schools with a significantly low student population is an uneconomic endeavour, particularly since a number of reputable studies conclude that there are no advantages to be reaped in terms of social and academic development from small class sizes.

Appendices

Appendix I – Organizational chart, Ministry for Education and Employment



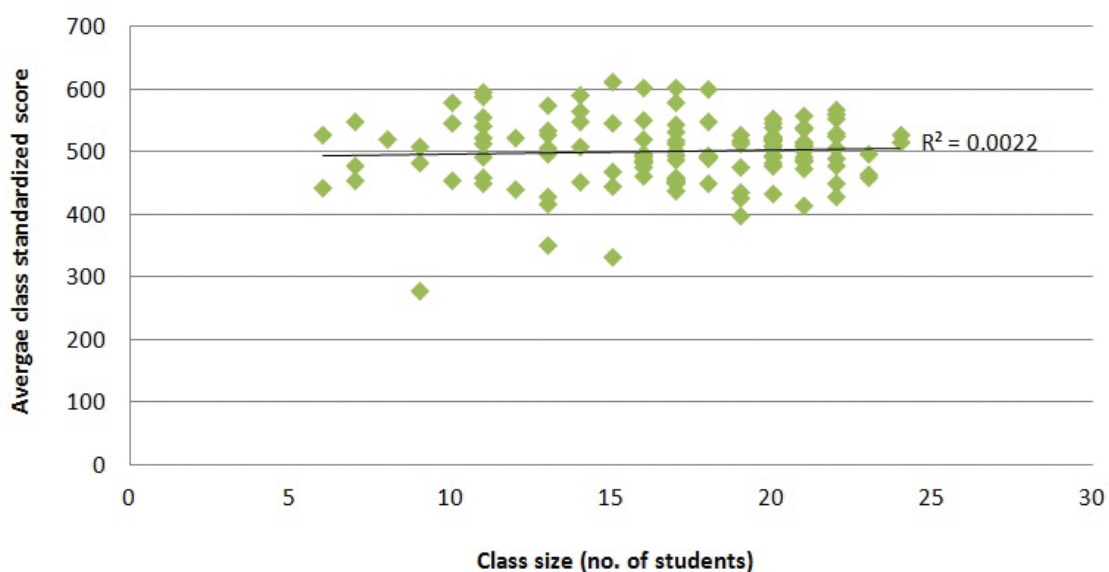
Source: MEDE

Appendix II – Correlation between class size and academic achievement by Years 4, 5 and 6 students in the three core subjects

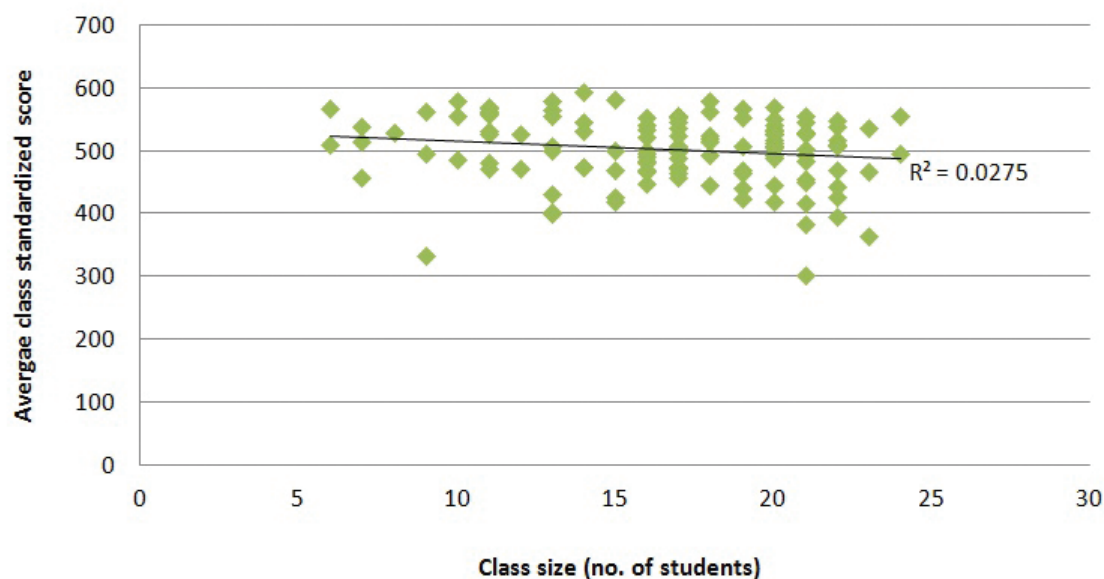
These scatter plots depict the relationship between class size, that is the number of students in a primary school classroom and academic achievement, in this case the average score attained by each Year 4, 5 and 6 class, in the three core subjects, namely English, Maltese and Mathematics.

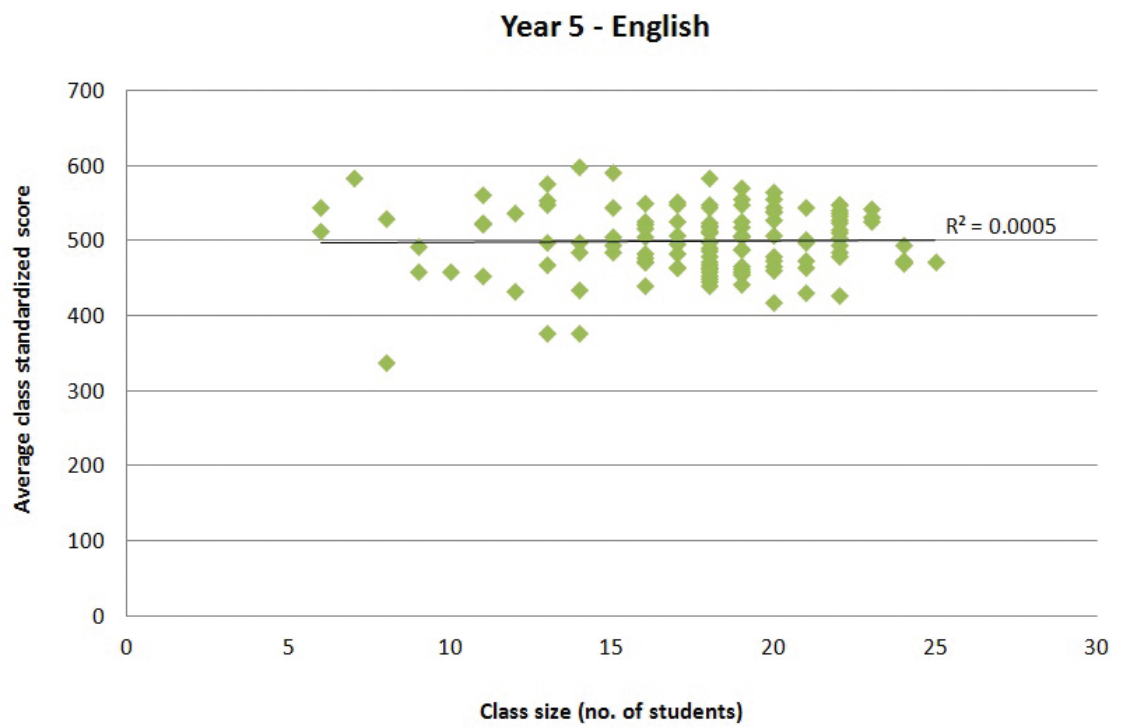
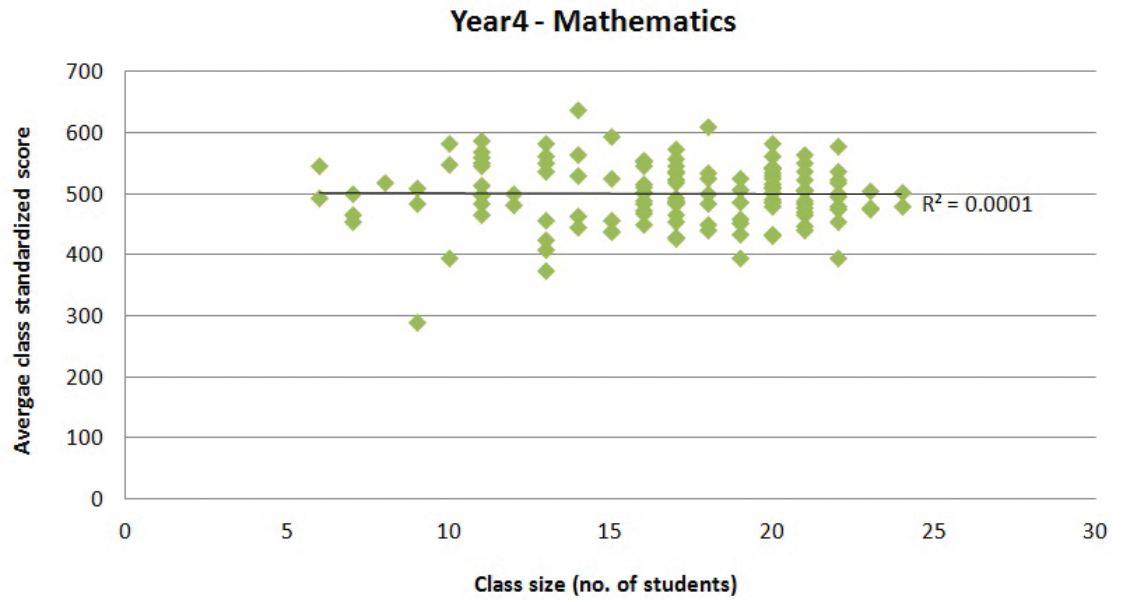
This analysis revealed that, generally, examination results achieved by state primary school students in all the three core subjects are not dependant on the respective number of students in each classroom (see Chapter 2, Section 2.6).

Year 4 - English

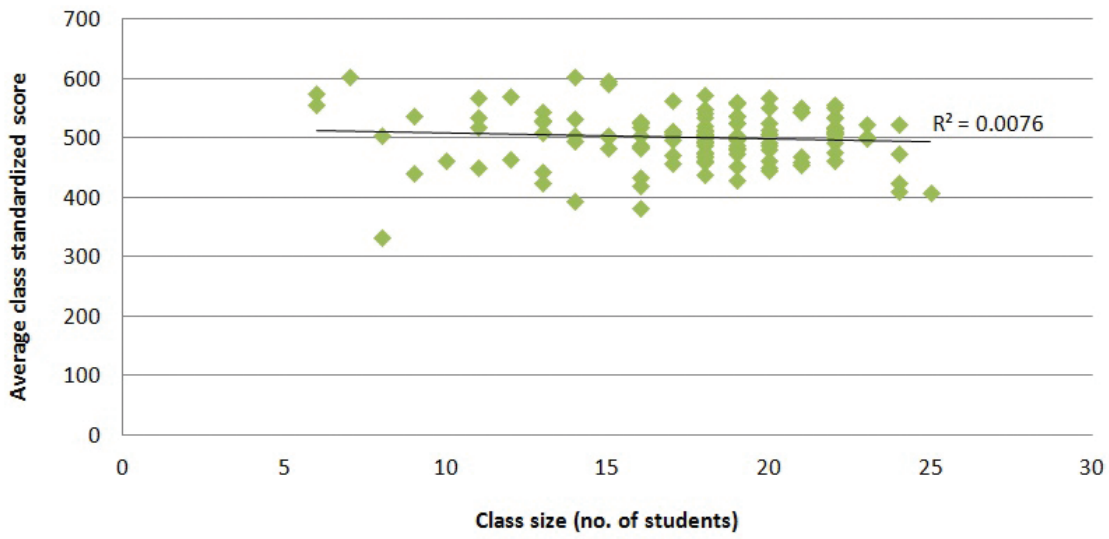


Year 4 - Maltese

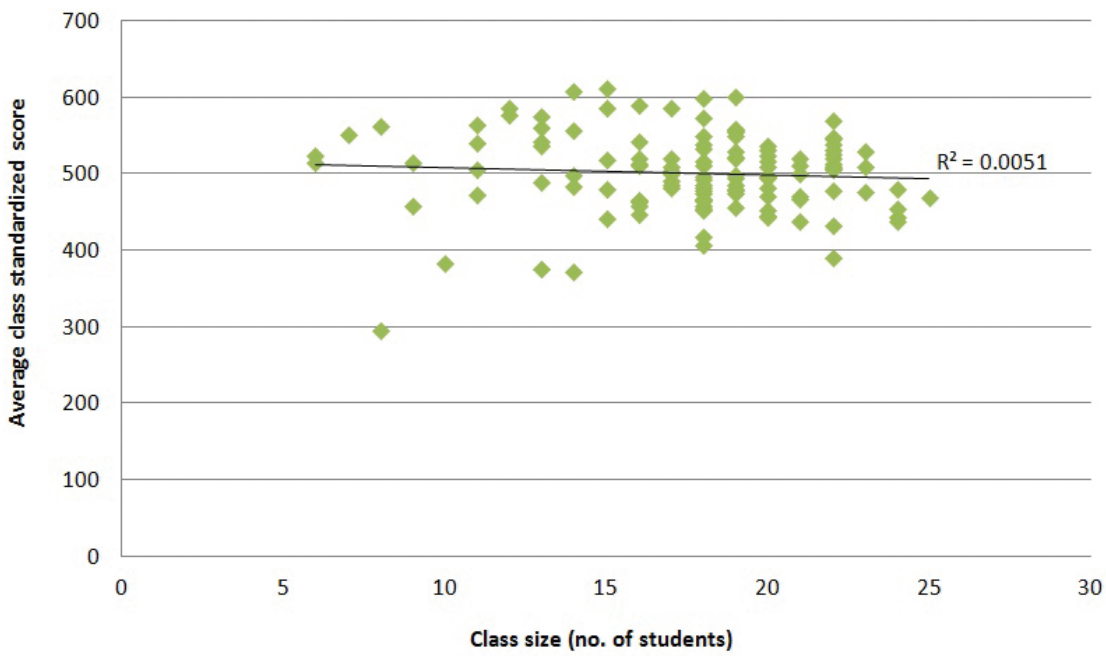




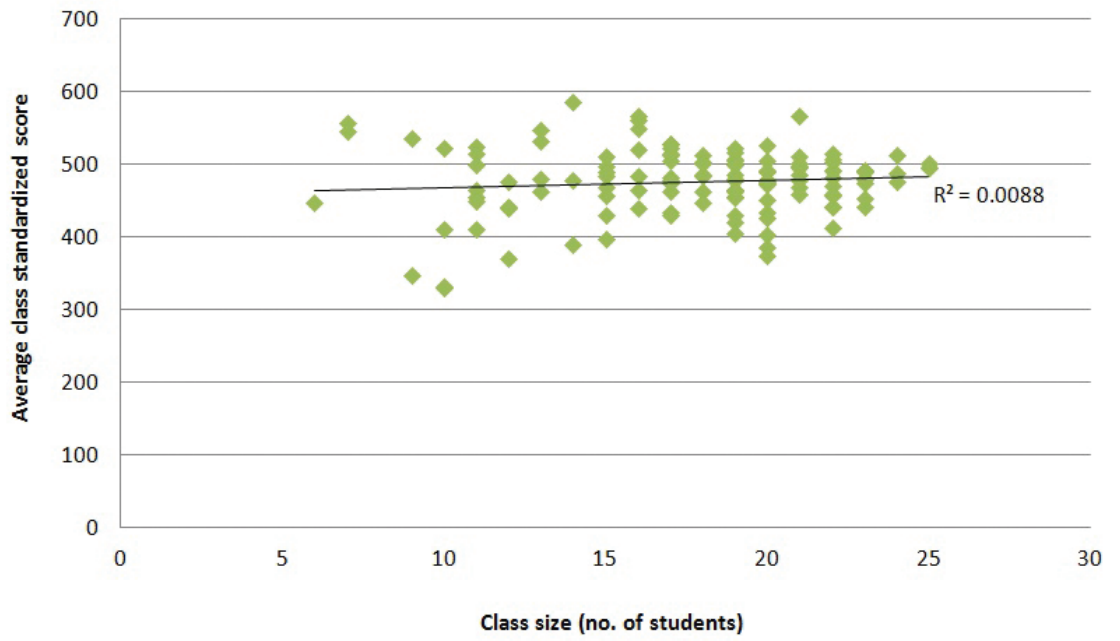
Year 5 - Maltese



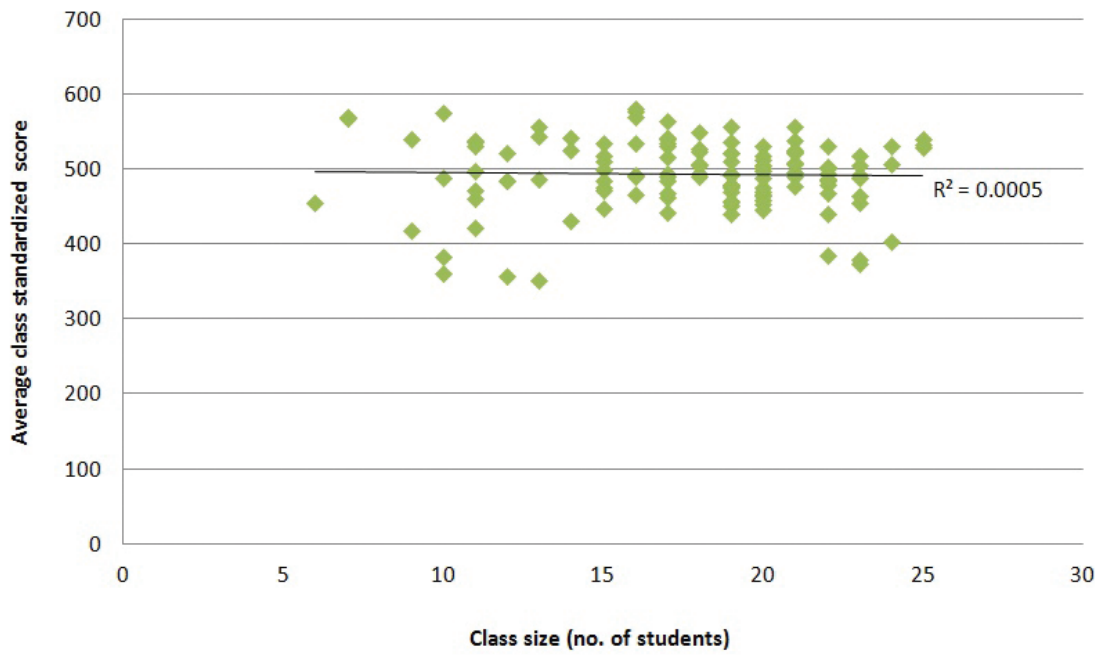
Year 5 - Mathematics



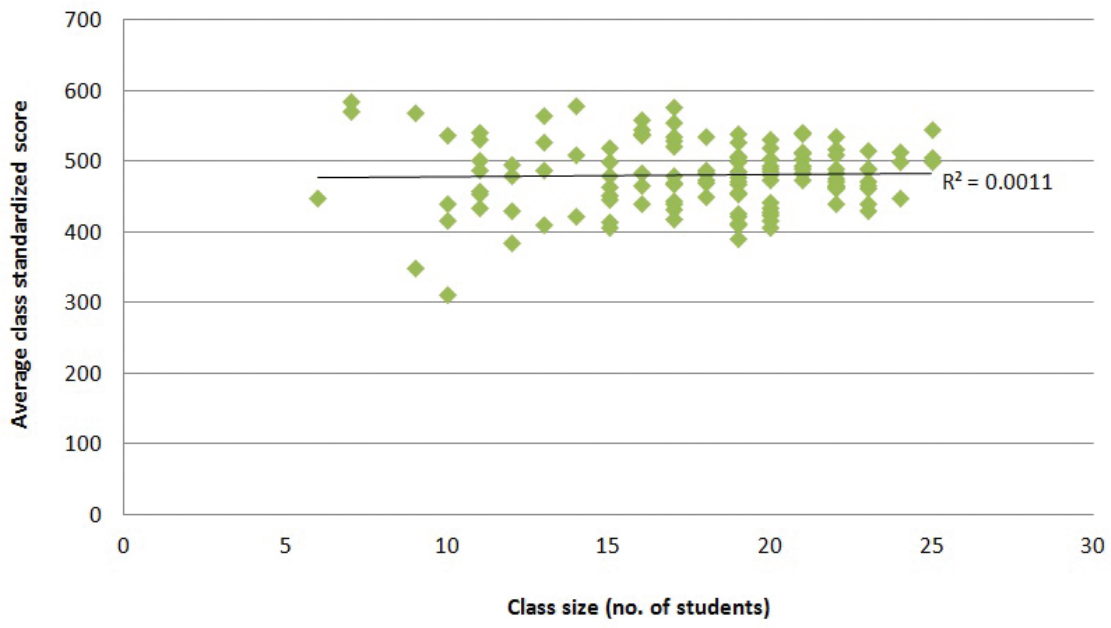
Year 6 - English



Year 6 - Maltese



Year 6 - Mathematics



Appendix III – Class spare capacity in state primary schools

The Tables below show the spare capacity available in each state primary school in Malta and Gozo in terms of the average number of students that were accommodated in classrooms, from Kindergarten 1 up to Year 6, as at commencement of scholastic year 2013-2014. Consideration was taken of established regulatory limits allowing a maximum capacity of 15, 20 and 30 students for Kindergarten 1, Kindergarten 2 and Years 1 to 6 respectively. However, as outlined in Section 2.4, in instances where students with special educational needs require the support of a Learning Support Assistant, these limits will be reduced. For the purpose of this exercise, Learning Support Assistants available in each school were equally distributed between the number of classrooms available. Moreover, due to infrastructural limitations influencing the number of students per class, the average class dimension of each school were also considered.

This analysis revealed that, in general, the classroom space available was limited, particularly when considering the potential changes in student population of each school, which occur from one year to another. In fact, during scholastic year 2013-2014, the overall student spare capacity in state primary schools amounted to around 16 per cent. Excessive spare capacity is highly evident in primary schools situated in Gozo with a general average of 33 per cent when compared to Malta's average of 15 per cent. Moreover, five out of the 11 primary schools in Gozo registered an available spare capacity that is greater than 40 per cent, where it is estimated that the San Lawrenz Primary School is operating at 71 per cent below its student capacity.

Analysis of spare capacity in the various primary schools should however be interpreted with caution. Although, in certain instances, spare capacity might be recorded, consideration should be given to the specific realities of the particular schools since a 'classroom' spare capacity does not necessarily imply a 'school' spare capacity. A case in point relates to St. Paul's Bay Primary School, which already accommodates a high student population and a 26 per cent classroom spare capacity is available. Despite the fact that an opportunity exists to make use of such spare capacity, further increases in the number of students would result in a school population of over 1,000 students, which would render it more difficult to manage.

Class spare capacity in Gozo state primary schools (scholastic year 2013-2014)

Gozo Primary Schools	Total Capacity (students)	Spare Capacity (students)	Spare Capacity (%)
Gozo College - Sannat Primary	290	122	42%
Gozo College - San Lawrenz Primary	150	107	71%
Gozo College - Għarb Primary	170	96	56%
Gozo College - Kerċem Primary	152	89	58%
Gozo College - Għajnsielem Primary	178	66	37%
Gozo College - Zebbuġ Primary	132	59	45%
Gozo College - Nadur Primary	246	52	21%
Gozo College - Xewkija Primary	134	49	37%
Gozo College - Qala Primary	153	38	25%
Gozo College - Rabat Primary (Gozo)	344	37	11%
Gozo College - Xagħra Primary	243	16	6%
TOTAL (Gozo)	2,192	731	33%

Class spare capacity in Malta state primary schools (scholastic year 2013-2014)

Malta Primary Schools	Total Capacity (students)	Spare Capacity (students)	Spare Capacity (%)
Maria Reġina College - St Paul's Bay Primary	1,094	283	26%
St Clare College - Pembroke Primary	607	165	27%
St Nicholas College - Mġarr Primary	425	163	38%
St Thomas More College - Marsaxlokk Primary	340	163	48%
St Ignatius College - Luqa Primary	404	150	37%
St Ġorġ Preca College - Valletta Primary	292	138	47%
St Margaret College - Żabbar Primary B	519	102	20%
St Thomas More College - Żejtun Primary A	500	96	19%
St Nicholas College - Mtarfa Primary	211	95	45%
Maria Reġina College - Naxxar Primary	506	94	19%
St Benedict College - Qrendi Primary	197	92	47%
St Theresa College - Lija-Balzan-Iklin Primary	382	84	22%
St Ġorġ Preca College - Marsa Primary	265	81	31%
St Clare College - St Julians Primary	206	78	38%
St Clare College - Sliema Primary	313	73	23%
St Benedict College - Żurrieq Primary	677	68	10%
St Nicholas College - Baħrija Primary	159	65	41%
St Benedict College - Gudja Primary	145	64	44%
St Margaret College - Xgħajra Primary	193	59	31%
St Ġorġ Preca College - Ħamrun SS Primary	208	55	26%
St Benedict College - Kirkop Primary	167	53	32%
St Clare College - San Ġwann Primary A	393	51	13%
St Benedict College - Għaxaq Primary	284	50	18%
St Ġorġ Preca College - Floriana Primary	158	50	32%
St Thomas More College - Tarxien Primary	273	49	18%

St Thomas More College - Fgura Primary A	548	47	9%
St Margaret College - Senglea Primary	174	46	26%
St Benedict College - Safi Primary	173	44	25%
St Benedict College - Birzebbuġia Primary	570	38	7%
St Ġorġ Preca College - Pietà' Primary	225	36	16%
St Theresa College - St. Venera Primary	511	36	7%
St Ignatius College - Siġġiewi Primary	513	36	7%
St Clare College - Gżira Primary	202	35	17%
Maria Reġina College - Ġhargħur Primary	147	33	23%
St Benedict College - Mqabba Primary	237	33	14%
St Margaret College - Cospicua Primary	245	30	12%
St Thomas More College - Żejtun Primary B	251	28	11%
St Margaret College - Vittoriosa Primary	161	26	16%
St Nicholas College - Rabat Primary	359	25	7%
St Theresa College - Msida Primary	321	14	4%
St Clare College San Ġwann - Primary B	183	13	7%
St Margaret College - Kalkara Primary	177	12	7%
Maria Reġina College - Mosta Primary A	611	11	2%
St Thomas More College - Marsascalea Primary	631	2	0%
St Ignatius College - Qormi San Bastjan Primary	513	1	0%
Maria Reġina College - Mellieħa Primary	466	0	0%
Maria Reġina College - Mosta Primary B	307	0	0%
St Ġorġ Preca College - Ħamrun GP Primary	306	0	0%
St Ġorġ Preca College - Paola Primary A	417	0	0%
St Ġorġ Preca College - Paola Primary B	266	0	0%
St Ignatius College - Qormi San Ġorġ Primary	351	0	0%
St Ignatius College - Żebbuġ Primary	531	0	0%
St Margaret College - Żabbar Primary A	477	0	0%
St Nicholas College - Attard Primary	441	0	0%
St Nicholas College - Dingli Primary	180	0	0%
St Theresa College - Birkirkara Primary	694	0	0%
St Thomas More College - Fgura Primary B	308	0	0%
TOTAL (Malta)	20,414	2,967	15%
TOTAL (Malta and Gozo)	22,606	3,698	16%

Recent NAO Publications

NAO Audit Reports

May 2014	An Assessment of the main Fiscal Forecasts prepared by the Ministry for Finance and Presented in the Update of the Stability Programme for Malta 2014-2017
June 2014	An Investigation into the Procurement of Legal Services by the Privatisation Unit between 2008 and 2013
July 2014	Performance Audit: Malta's Level of Preparedness to Deal with Oil Pollution at Sea
July 2014	Information Technology Audit: Employment & Training Corporation
October 2014	Foundation for Tomorrow's Schools: Regularity Audit on Procurement
October 2014	An Assessment of the Macroeconomic Forecasts for the Maltese Economy prepared by the Ministry for Finance in September 2014
November 2014	Performance Audit: Housing Authority's Procurement of Repair Works on Residential Units
November 2014	An Assessment of the main Fiscal Forecasts prepared by the Ministry for Finance and presented in the Draft Budgeted Plan 2015
December 2014	Annual Audit Report of the Auditor General - Public Accounts 2013
December 2014	Annual Audit Report of the Auditor General - Local Government 2013
January 2015	Information Technology Audit: Commerce Department
February 2015	An Analysis of Types of Errors in Public Procurement within the Structural Funds Programmes
February 2015	An Investigation of Government's Acquisition of the Café Premier
March 2015	An Analysis of Enemalta Corporation's Hedging Activity during 2014
April 2015	Performance Audit: Provision of Residential Long-term Care (LTC) for the Elderly through Contractual Arrangements with the Private Sector
May 2015	Audit of Gozo Channel Company Limited: Public Service Obligation Bid Feasibility and Operational Considerations

NAO Work and Activities Report

May 2015	Work and Activities of the National Audit Office 2014
----------	---