Increasing Primary School Places in London and the South East

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ABSTRACT

There is a national demand for school places in the U.K; a few contributors include higher birth rates, increased migration, and people living longer. Presently 729,000 additional primary school places are needed by 2020. The demand for these school places is a major problem, which is affecting children, families and school teachers. Past research has shown how high-quality school places can reduce bullying, increase staff productivity and boost academic performance. In the last 20 years government parties have declared education to be a priority and a considerable amount of funding has been released through programmes. Nevertheless, there remains a desperate need for more primary school places. This study sought to investigate how to increase primary school places in London and the South East, where the need was greatest. The findings of the research were assembled by using case studies; nine primary schools in London and the South East which innovatively dealt with the shortage of school places. It was found that procurement methods, prefabrication, innovative alternatives, better use of resources and community schools were the most viable solutions to the primary school places issue in London and the South East.

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CHAPTER 1 INTRODUCTION

1.1. Background

Throughout the post-war period there have been many attempts to reform the UK education system. Specific problems in the UK education system include falling standards in schools, compulsory age in education and skills improvements. The 1966 Education Act states "The parent of every child of compulsory age shall cause him to receive efficient full-time education suitable…either by regular attendance at school or otherwise". Due to this Act children in Britain are required by law to receive education from the age of 5 to 16, with primary school education from age 5 – 11. Parents have the option of schooling their children themselves at home, but what is the reason that the majority of parents prefer to send their children to a school environment as opposed to home schooling them?

A classroom is a place of learning involving at least one teacher and one student; a school on the other hand is more than a place or building. A school can be defined as a 'group of persons who share the same beliefs or opinions' (Webster, 2016). This definition of school insinuates that schools can exist outside a designated building; what makes a setting involving a teacher and pupil so beneficial? Schneider (2001) and Esytn (2007) discovered that school facilities and factors such as ventilation, lighting, building age, quality and aesthetics could sharply affect academic performance especially in primary schools.

1.2. Problem to be investigated

For many, primary schools are a place of education and for some a place of work therefore with this in mind, school buildings must meet the needs of all end users. This makes primary schools different from other types of buildings, which are not required to serve so many categories of people. This point can at times be challenging for design teams.

The National Audit Office investigated funding for new school places in 2013 and identified the following problems experienced by pupils in primary schools:

- Students have to travel a further distance to get to school
- Study takes place in crowded conditions
- Exposure to damp, leaky buildings possibly containing asbestos is common

The aforementioned problems would easily affect an adult, let alone a child. The well-being, academic performance and behaviour of pupils are being influenced by the lack of school places and poor building conditions. If children are being affected then their families are also.
The problem of a shortage of school places and poor building conditions has far reaching effects going from children, families and teachers to the UK economy. Therefore it is critical to undertake research producing findings that will hopefully bring solutions.

1.3. Importance and benefits of study to research and construction

The immediate beneficiaries of this research are those who work on primary school construction projects such as the client, contractor and consultant. The consultant typically will be an architect or engineer and the contractor will have a project manager, site manager and quantity surveyor. These roles will definitely be affected by the procurement route of the project. The client role can involve many people but simplified will consist of the 'funding client, owner client and the user client' (Giddings & Prins, 2016).

The 'owner client' such as local authorities and the government will benefit from this research because more primary school places can be delivered through innovative methods. The 'user client' such as parents, pupils and teachers will benefit from the boost in academic performance and staff productivity that research shows well maintained/designed buildings can bring. The 'funding client' such as the education funding agency will be pleased to know how better primary schools can be delivered for the same or less financial investment through innovative design. Contractors and consultants will be eager to know how strategic innovative decisions can reduce building time and improve overall quality

1.4. Aims of research

The aim of the research was to investigate how more primary school places can be provided in London and the South East.

1.5. Objectives

- To investigate solutions to the lack of primary schools in London and the South East.
- To evaluate the practicality of the solutions identified from research methodology.

- To synthesise research acquired and recommend how the construction industry can contribute to increasing primary school places.

1.6. Research Layout

This research encompasses 6 chapters; each chapter dealing with a different aspect and stage of the study from beginning to end. The research layout is presented in table 1.1.

Research Chapter			
Literature Review	**Methodology**	**Results and Discussion**	**Conclusion and Recommendations**
The literature review is where past, present and future study comparable to the research title is discussed in terms of strengths, limitations and contribution to research and construction.	The methodology of this study can be found in chapter 3. This is a thorough account of how the research was carried out in order that its results can be repeated successfully for reliability.	The fourth chapter depicts and discusses the findings of the study. The findings are explored in terms of validity in light of already published data.	The 5th and final chapter is a summarization of the study; it highlights the final overall results and comments on these results in light of the original aim of the study. The recommendations applicable to the construction industry are presented in this section.

Table 1.1 Research Layout

CHAPTER 2 LITERATURE REVIEW

2.1. Introduction

This section encompasses a compilation of already published data relating to the aim of this study. This study is not the first to discuss the predicament of insufficient school places. As this chapter will reveal, much has already been written on the topic at hand; nonetheless, the problem is at large and requires a fresh perspective to find some feasible solutions.

2.2. Government Programmes

In 1997 Tony Blair, prime minister at the time, stated how the education sector would be

prioritised; 20 years on and there has been a vast amount of funding and several government programmes yet the results are limited. The EFA (Education Funding Agency) is an executive agency of the Department for Education (DfE) who are responsible for the funding of schools. Figure 2.1 shows a timeline of government programmes.

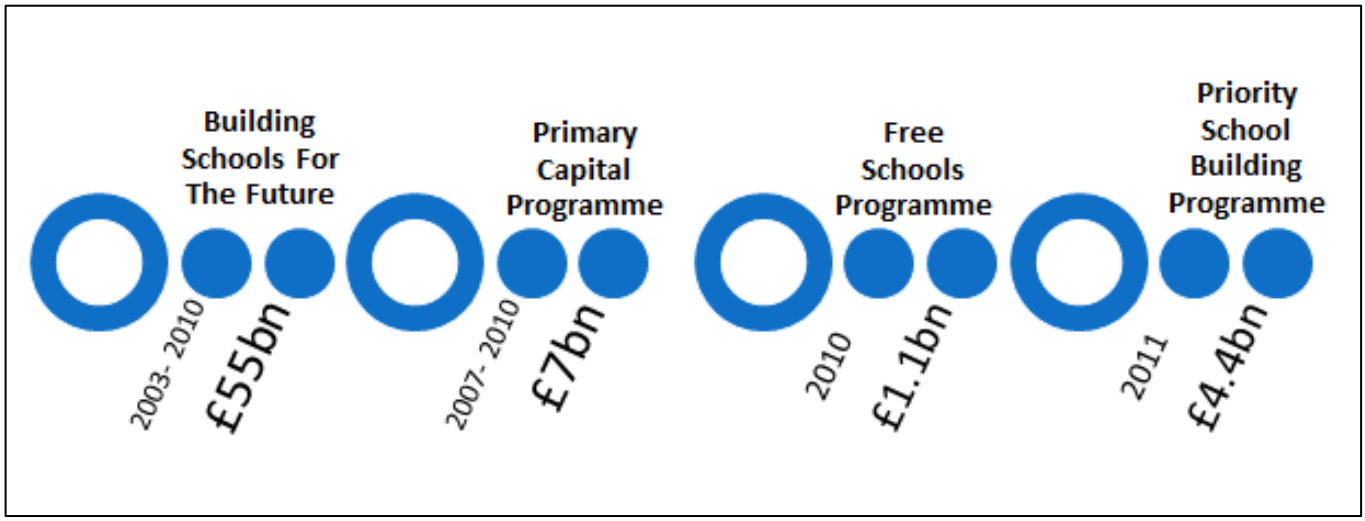

Figure 2.1 Government programmes timeline

As shown in figure 2.1, the Building Schools for the Future programme (BSF) was a £55bn initiative to build and refurbish 3500 secondary schools by 2020. More relevant to this study was the Primary Capital Programme (PCP) worth £7bn, which aimed to refurbish 17000 primary schools by 2023. Unfortunately in 2010 both BSF and PCP were affected by the governments' capital funding reduction (Gov.Uk, 2015). The Priority School building Programme (PSBP) was launched in 2011 divided into 2 parts; PSBP 1 and PSBP 2. PSBP 1 was inundated with applications from primary schools across the country with only 261/580 successful applications, which are expected to be completed by 2017. PSBP 2 aims to rebuild and refurbish 277 schools between 2015 and 2021.

Despite the combination of capital funding and private finance, there remains a staggering amount of primary schools not refurbished and not built. Primary schools are undoubtedly expensive to build and maintain. Lack of funding is partly a factor in the shortage of primary school places, however as the history of government programmes reveals, more innovative approaches other than refurbishment and building new primary schools must be undertaken to solve the issue at hand.

2.3. Current U.K primary school place system

In the U.K local authorities manage the admissions process for the primary schools in their region; parents and legal guardians must choose up to 6 primary schools via an online/paper application. Applications in many parts of England begin in October with deadlines typically in January, results of applications are made known by April and parents have until May to accept or decline offers. Between May and September families can appeal regarding school offers; upon accepting a school offer the child will be required to start the school in September.

Many families are left devastated every year due to not receiving offers from their preferred schools, meaning settling for a poorer performing school or having to travel a further distance. In 2014 only '6% of appeals were upheld for primary school' applicants in Kent, South East England. This is incredibly low (Kent advice, 2015).

2.4. Current solutions for school places

In 2013 the DfE published the report 'Capital funding for new places' in which they surveyed 122-125 local authorities on what solutions they were exploring to deal with the lack of school places. Solutions were categorized as school organization, accommodation solutions and non-accommodation solutions. Each of the 17 solutions was rated as either 'great extent' or 'some extent'; results are shown in figure 2.2.

Bearing figure 2.2 in mind it is alarming to consider that councils are so desperate they are trying to fit as many children in one class as possible and reducing playground space in order to accommodate more children. These are temporary measures that cannot be sustained and are in no way a viable permanent solution to the shortage of school places. New, innovative and viable solutions must be explored, which is the focus of this study.

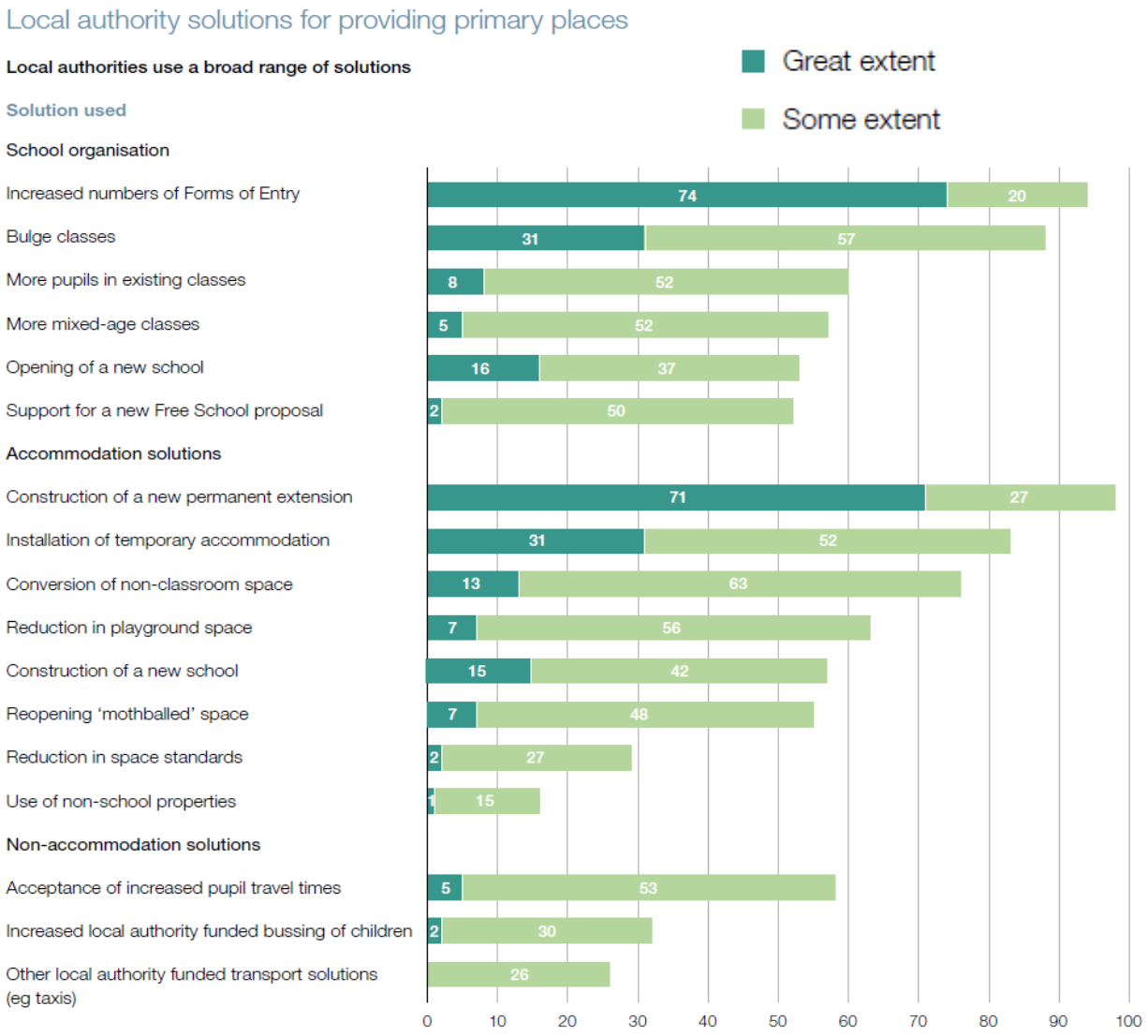

Figure 2.2 Local authority solutions for providing primary places (NAO DfE 2103)

2.5. Creating excellent primary schools

In 2010 CABE (Council Commission for Architecture and the Built Environment), a leading authority on school designs at the time, produced an inspiring article on creating excellent primary schools. One of the key principles highlighted by CABE was that good primary schools are a result of visionary clients and effective design and build teams. CABE (2010) stated 'There is a clear link between well-designed primary schools and pupil performance and behaviour. Successful school design is the result of hard work and collaboration between designers, contractors and visionary, committed clients'.

CABE (2010) writes 'when pupil numbers increase unexpectedly, a solution to capacity problems is pre-fabrication'.

Along with prefabrication CABE also proposed designing larger classrooms, which are paramount and can be achieved as demonstrated by Pinewood Primary School; a case study looked into by CABE in 2000. Pinewood School purposely built high ceilings, hidden and built in storage and toilets to allow room for extra children and different teaching arrangements. The larger classrooms overcame the problems associated with overcrowded classrooms.

2.6. Review of Education Capital

A year after the CABE (2010) article was published another revolutionary report was released: The Review of Education Capital (2011). The exhaustive report on capital funding for schools at the time identified 3 major areas that needed reconsidering: capital allocation, design and build, procurement and maintenance.

There are some similarities between the CABE (2010) article and 'The Review' (2011) in addressing school places. Both articles are not adverse to the idea of prefabrication; below is a case study from the Review (2011).

Swindon Borough Council Case Study (Review of Education Capital 2011)

Swindon Borough Council has had a significant growth in children of Primary School age and has therefore been fighting an uphill battle to create enough Primary School places to meet this burgeoning demand.

The Flexible School Project is a timber frame modular system consisting of a teaching block (which can be adapted to form any kind of public access facilities or classroom block) and a link block containing wet facilities such as toilets and showers.

The team have obtained firm quotes of between £3.2 and £4.4m for a one and two form school respectively which compares very favourably with the £6-7m average cost of equivalent facilities built recently in the Borough.

In addressing school building conditions 'The Review' (2011) comments 'a divided responsibility of building maintenance between school and local authority is confusing and making

investment across schools harder'. The report also addressed funding allocation stating 'some schools were using funding allocated for maintenance on ICT equipment' and although these were secondary schools; it does beg the question of whether the primary schools of today are using funding allocated for maintenance correctly?

2.7. Building a better Britain

The Royal Institute of British Architects (RIBA) have contributed to influencing policies in the construction industry, as have the Chartered Institute Of Building (CIOB). In 2014 RIBA published 'Building a better Britain'. The report investigated major issues in the U.K; amongst the topics was the lack of school places and school building conditions. The report established 4 recommendations surrounding the topic:

- Increase cost per square metre for PSBP schools by 20%. Schools are simply not standing the test of time.
- The size of schools funded by the Government should return to the areas recommended in Building Bulletin 98, 99, 102.
- Scoring on procurement to change from cheapest wins to improve design and deliver long-term cost effectiveness and social value.
- Improving research on school management, maintenance, energy costs, and other indicators PSBP schools are currently required to record.

Recommendation 1 states that an increase of funds from the most recent government PSBP by 20% can increase building durability. Governmental funding is essential to increase primary school places and improving school buildings; similarly 'The Review' (2011) did not shy away from questioning governmental funding allocation.

Surprisingly RIBA (2014) discovered that school designs are now 15% smaller than those that were built under the BSF programme. Areas that have been reduced in size include 'corridors, canteens and assembly halls'. This is due to inflation as it is costing governments more to 'procure the same products and services'. This leads onto recommendation 2; restoring school sizes and recommendation 3; reviewing procurement approaches. The final recommendation from RIBA (2014) encourages research regarding the topic of school building maintenance,

which this study is accomplishing

The above recommendations from RIBA (2014) coincide with some of the writings of predecessors; however key themes such as procurement, school sizes and governmental funding remain obstacles until today.

2.8. Better spaces for learning

Two years after publishing 'Building a better Britain' (2014) RIBA revisited the concern over schools in the U.K by publishing 'Better spaces for learning' (2016). This report focused strictly on schools as opposed to the previous report. Three recommendations were established in the report:

- Reviewing how information and communication flows between the school, Government, and design and construction teams during a project.

- Adopting a more flexible approach to the rules governing the design and size of new schools to allow for the best possible use of resources.

- Taking a smarter approach to the use of building management equipment that controls the internal environment of modern school buildings.

Comparing the summarizations and recommendations between RIBA (2014) and RIBA (2016) the focus shifted from actions to approaches. It is harder to measure the implementation of approaches than actions. RIBA (2016) centers on the advantages of quality school design, the impact of dilapidated buildings on children and teachers and what the government needs to do in response.

2.9. Summary

This chapter began by focusing on past government programmes that promised to build and refurbish more primary schools in order to accommodate more children. Unfortunately many of these programmes had limited success. The current U.K school place system and the solutions being used by local authorities to help children without school places were also highlighted. The solutions being explored by the local authorities appeared to be more temporary fixtures than permanent solutions. The similarities, differences and

recommendations of past research from reporters and professional bodies were also understood.

CHAPTER 3 METHODOLOGY

3.1. Introduction

This chapter will reveal the methodology undertaken to produce this research. The appropriate methodology technique for this study was carefully considered in order to generate reliable and valid data for analysing and reaching conclusions. The decision was made to use case studies/qualitative research based on the research objectives, literature review, issues and topics.

3.2. Research brief

Although the lack of primary school places in London and the South East has been an issue for a number of years the research in this study has been carried out to expand the knowledge of this subject area. As long as there is population growth there will always be an issue of lack of school places nationally, and existing school buildings will face accelerated degradation through overuse. However this research is focused on identifying innovative solutions to problems being investigated.

3.3. Research purpose and approach

The purpose of using case study research was to fulfill the objectives of this study, specifically objectives 1, 2 and 3 listed again:

- To investigate solutions to the lack of primary schools in London and the South East.
- To evaluate the practicality of the solutions identified from research methodology.
- To synthesise research acquired and recommend how the construction industry can contribute to increasing primary school places.

The qualitative research acquired originates from the 9 case studies that involved local

authorities in London and the South East who worked on primary school projects involving new builds/extensions or maintenance/refurbishments. These 9 case studies contain information about 9 primary schools which dealt with the shortage of school places innovatively.

3.4. Research strategy

According to Bromley (1990), case studies are a 'systematic inquiry into an event or a set of related events which aims to describe and explain the phenomenon of interest'. This method is most useful when a large sample is not available. On the other hand, where there has been a lot of previous reporting on a particular topic, case studies are helpful in determining correlations between studies and investigating trends. Single or multiple case studies can be used in an investigation; this study used multiple case studies in order to have greater generalization.

Zanail (2007) highlights three categories of case study research, namely exploratory, descriptive and explanatory case studies as follows:

- Exploratory case studies set to explore any phenomenon in the data which serves as a point of interest to the researcher.

- Descriptive case studies set to describe the natural phenomena which occur within the data in question.

- Explanatory case studies examine the data closely both at a surface and deep level in order to explain the phenomena in the data.

Considering the above case studies' categories, the exploratory category was the most used in this study. The phenomenon being explored was the solutions to school places in each case study, which is the aim/point of interest for this research.

3.5. Data analysis

Creswell and Clark (2007) state how both quantitative and qualitative research can be used to analyse, explore, represent and validate data gathered. Quantitative data is easily presented in charts, figures and tables. Qualitative data can be presented as a discussion of the evidence

gathered. Williams (2014) states 'validating the data in the quantitative research means the researcher can gain insight and information from the results, which can be used as a reliable source over time'.

CHAPTER 4 RESULTS AND DISCUSSION

4.1. Introduction

The primary aim of the results and discussion chapter is to fulfill the second objective of this study. In order to achieve this several case studies will be presented in order to identify the solutions to the problem of investigation and evaluate how replicable they are.

4.2. Identifying the primary causes

Much can be written about the reasons why there is a shortage of primary school places and existing school buildings are in dilapidated conditions. In essence there is a shortage of school places because there are simply more children than school places available. There has been a rapid increase of population and migration into the U.K in a short space of time. Governments and local authorities were slow to foresee this and release the funding needed for expansion of schools, construction of new schools and refurbishment of existing schools. Further to the population and migration increase some existing schools have overridden directives from local authorities to expand.

Procurement methods used in the past have not always been the most efficient; particularly the length of time taken to receive planning permission for school projects to go ahead. Additionally, contracts have been given to contractors with insufficient funding and building time which ultimately affects the quality of the schools delivered. Time pressures to get children school places by term start dates has also encouraged short cuts resulting in buildings with major defects being handed over to clients, putting children and staff at risk.

Despite the plethora of drivers of lack of school places there have been many successful attempts to deal with this problem in different parts of the U.K. Reviewing what has worked before elsewhere is pivotal in addressing this long lasting issue.

4.3. Quality and Quantity

There has been much discussion of the need to increase primary school places in London and the South East. However the focus must not just be on the quantity of school places but also the quality of school places. RIBA (2016) stated that between '2015 and 2018 £4.2bn will be spent on essential school maintenance which could be avoided'. In the same article it was stated '£450m will be spent on heating, cooling and lighting schools which could have been prevented if better design, maintenance and control systems were implemented in the school buildings at the onset'. Building well designed, quality schools will save money which can be used to create more school places or maintain/extend existing schools.

4.3.1. South East award winning schools

There are some uniquely designed award winning quality schools in the South East. Three primary schools by architects Hampshire County Council (HCC) particularly demonstrate why quality schools should be regarded as highly as quantity of school places.

The first award winning school (RIBA award 2009) by HCC is Burnham Corpse primary school. The school is located in Hampshire where £2.7m was invested for 'remodelling and extending the former Junior School to become a one-form entry primary school building' CABE (2010). The project was traditionally procured and completed in 38 weeks which was on time. Refurbishing and adapting the existing building proved more economic than demolishing and starting again. The new primary school also possesses pre-school accommodation. This is a great example of a quality school which has addressed the lack of school places in Hampshire. The distinctive Burnham Corpse building can be seen in figure 4.1.

Figure 4.1 Burnham Corpse primary School

Hatch Warren Junior School is another distinctively designed school building by HCC and also winner of the Redland's roofing prize (1992). The primary school continually has high performing pupils and receives outstanding OFSTED (Office for Standards in Education) reports. As mentioned earlier research shows a link between learning environments and academic performance. Figure 4.2 shows Hatch Warren Junior School in all its splendour.

Figure 4.2 Hatch Warren Junior School

The final HCC School to be discussed is Woodlea Primary School. The school is winner of the Civic Trust Award, RIBA 'Building of the Year', BBC Design Awards and Education Award. The accolades alone speak for the building. What is to be emphasized here is not the awards but the quality aspect. Modern schools of today are just being built to accommodate children, not realising the impact of the building on children and staff. Figure 4.3 shows Woodlea Junior School.

Figure 4.3 Woodlea Junior School

The following findings from education specialists reiterate the importance of designing quality school places:

- Narrow corridors can increase chances of bullying at peak times.
- Smaller classrooms encourage disruptive behavior.
- Smaller playgrounds stifle the ability for children to form relationships.

Quality must not be overlooked in the bid to increase primary school places in London and the South East. More damage than good can be done if the focus is solely placed on quantity of school places.

4.4. Pre-fabrication

Pre-fabrication is essentially the manufacturing of a building or parts of it in a factory, which is delivered then taken to site where it is assembled. Table 4.1 describe 4 methods of pre-fabrication.

Types of Pre-fabrication

Complete pre-fabricated buildings	Panellised pre-assembly	Volumetric pre-assembly	Component pre-assembly
Offers fastest construction times, as series of units that make up a complete building. Usually fully factory finished inside and outside.	Require finishing inside and outside, large panels constructed in a factory then assembled on site.	Units such as toilet pods or plant rooms that are fully factory finished and installed within or added on to a building structure.	Smaller-scale items constructed off-site then fitted into the building structure. The time savings for this approach are much less.

Table 4.1 Pre-fabrication types (Creating Excellent primary schools 2010 pg. 112-113)

Despite the advantages of pre-fabrication such as reduced building time, and a cheaper build cost, in some cases there are limitations. Table 4.2 shows some defects associated with pre-fabrication.

Prefabrication potential problems

Possible overheating in summer and heat loss in winter
Dimensions of classrooms have to be reconsidered as may not be able to fit in delivery vehicles
Spaces may be left around the buildings that have little use and are difficult to supervise due to shape of building
Costly maintenance is required soon into their life because of poor durability with some units

Table 4.2 Defects of pre-fabrication CABE (2010)

The defects associated with pre-fabrication in table 4.2 above appear very serious however these defects are not guaranteed. Prefabrication has truly advanced in the last 7 years since CABE published their report and many clients have used them for commercial, public and education buildings.

4.4.1 Prefabrication in London and South East

Willmott Dixon is the U.K's leading contractor for building free schools and state schools. In the 'last 3 years they have built 100 schools and delivered 30,000 school places in the last 5 years' (Willmott Dixon, Schools, 2016). Willmott Dixon have a programme for delivering pre-designed buildings; a joint venture between them and Scape. Through this programme their clients will be given a fixed cost, timescale and computer model of what the school will resemble.

In 2015 Willmott Dixon was awarded a £21m contract to deliver three schools; Newton Leys, Fairfield and Whitehouse Primary Schools for Milton Keynes council in the south east. Phase one of the council's £160m schools investment programme involved building 7 new schools and expanding 12 existing schools by 2018.

Figure 4.4 shows the proposed design of Newton Leys primary school to be built by Willmott Dixon in Milton Keynes.

Figure 4.4 Newton Leys primary school

Combining predesigned and prefabricated buildings to build primary schools such as Newton Leys in figure 4.4 above is an innovative solution for clients facing school place shortages. Peter Owen, managing director for Willmott Dixon, commented that "The first three schools will deliver 2,000 additional primary places and by using the Scape Major Works framework, Milton Keynes will save time and cost which can instead be channelled into important areas such as front line services".

In London there has also been much use of prefabricated buildings. Lakehouse contracts a major contactor on the Greenwich framework who have successfully built 3 modular buildings; Woodhill Primary School, Greenwich Peninsula Primary School and Kidbrooke Skills Centre. Figure 4.5 shows Woodhill Primary School in Woolwich.

Figure 4.5 Woodhull Primary School

Woodhill Primary School shown in figure 4.5 does not appear like a prefabricated building at first glance. This is because of the external brick cladding disguising the modular facade. The three storey building comprises of 9 classrooms serving reception, year 1 and year 2 students on the different floors. The project was completed in just 20 weeks which is nearly half the time a non-prefabricated newly built school would take to build.

To summarise the case for prefabrication, the aforementioned case studies presented in London and the South East show that it is a viable solution to the lack of school places. Industry renowned contractors are using predesigned and prefabricated buildings and therefore clients can trust these products. The past stigma of poor modular quality temporary classrooms must be removed to fully embrace this innovative solution. As stated earlier, prefabrication can be compartmental; this is also something to consider if schools and councils simply want to expedite time with extensions.

4.5. Better use of resources

In some parts of the world such as Scandinavia and America converting buildings for other purposes is very common. Some of these building have been converted to function as primary schools. In recent years local authorities in the U.K have begun to look into using and converting buildings to deal with the school places shortages.

Transforming buildings into primary schools is truly innovative and a better way to use the resources that are already available. However before councils consider this option there are several structural aspects to regard. Table 4.3 shows these considerations that must be judged.

Table 4.3 Conversion of existing buildings (BDC 2007)

Conversion Considerations
Buildings need high ceilings to replace systems and services to that of schools.
Structures that have adequate water and sewer service
Investigate the structural capacity of the existing foundations
Can added security measures be incorporated to the building
Check roof for structural stability and thermal performance

The above table shows 5 attributes existing buildings must be able to accommodate in order to be converted successfully into a primary school. American firm Fanning Howey advises 'If the conversion will cost more than two-thirds the cost of a new building, then new construction should be considered'. Elsewhere Howey also comments that 'If the project does not save at least 50% over new construction' then conversion should be aborted.

4.5.1 Conversions in London

When the need for additional school places in Putney arose Wandsworth council solved the problem by converting a closed down hospital into a primary school. Figure 4.6 shows Putney hospital which was converted into Putney primary school shown in figure 4.7.

Figure 4.6 Former Putney Hospital

Wandsworth council expects Putney School below in figure 4.7 to eventually cater for 420 children. The council stated how they had previously 'expanded either temporarily or permanently 18 schools in the last 3 years'.

Figure 4.7 Putney Primary School

In South West London, local primary school Abacus Belsize is expanding to be able to accept children from Hampstead and South End Green. However rather than build new schools Camden council are planning to transform Hampstead police station to serve as the new base for the school. The proposal is expected to take the school's capacity from 210 children to 420 by 2024. If plans are agreed and the conversion takes place this will be another area to overcome the school places shortage with the innovative solution of conversions.

In 2014 the Education Funding Agency purchased Hackney central police station in East London for £7.6m; plans were being drawn to convert the station to a new base for Olive primary school. In 2016 the plans were refused by Hackney council after 654 responses from residents and others. Of the 654 responses 573 were in support, 81 were objections and 3 concerns were raised. Major traffic congestion was cited as one of major issues that would arise with the conversion.

Concluding on conversions, the case studies discussed highlight the structural limitations and the possible refusal of plans from local residents when converting existing buildings.

Nonetheless converting buildings is achievable and is an innovative solution worthy of being explored by councils in London and the South East. An alternative option to converting whole buildings is for councils to look at expanding and turning local secondary schools to all years schools accommodating both primary and secondary school-aged children.

4.5.2 Rooftop playgrounds

Under the umbrella of better use of resources comes another emerging innovative concept for conversions: rooftop playgrounds. Some primary schools are not reducing the playground area as advised but rather relocating it on top of the roof of their school building. The advantage of this is that space is saved and this space can be used to create extra classrooms for learning,

Putney Primary School, previously mentioned for being an example of a successfully converted building, also has a rooftop playground. Figure 4.8 shows the rooftop plant area.

Figure 4.8 Putney Primary School Rooftop plant area

The Village School in Brent, North West London possesses a beautiful rooftop playground as shown in figure 4.9.

Figure 4.9 The Village School Rooftop playground

When considering a rooftop playground the issue of safety arises immediately, however security is prioritized by building high perimeters with external canopies around the rooftop play area. Putney School and The Village School mentioned above are amongst the many schools embracing rooftop playground designs. Bow School in Tower Hamlets, East London and Gascoigne Primary School in Barking, Greater London also have rooftop playgrounds. This unique design is very practical, safe and a great way to save space for future extensions.

4.6. Innovative alternatives

This chapter has so far discussed the importance of quality, prefabrication and better use of resources as solutions to the primary school places issue in London and the South East. Apart from these approaches there are other innovative options being explored by primary schools across the country.

4.6.1 School buses

In Cornwall the head teacher of Parc Eglos primary school spent £3500 converting a school bus to provide extra classrooms rather than building a £15000 extension to the school. (The Guardian 2010). The same was done in Northumberland where head teacher David Godfrey of Central First School purchased a double decker bus for £5000 and converted it for £3000 (Express 2014). More geographically relevant to this study in East London 'The Playbus Charity' has been teaching and engaging children in their 'Nursery on Wheels' since 2009 (Evening Standard 2016). The Playbus Charity is seen in figure 4.10.

Figure 4.10 Nursery on Wheels (Evening Standard 2016)

4.6.2 Floating classrooms

The Beauchamp Lodge Settlement charity in central London has been providing science and history lessons to visiting schools on boats. These lessons provide a unique outdoor learning experience to primary school pupils across the U.K. Figure 4.11 shows a science lesson taking place on a boat where pupils are being taught about 'forces, structures, water cycles and floating and sinking' (The Floating Classrooms 2011).

Figure 4.11 Floating Classrooms

4.6.3 Outdoor Classrooms

The Queen Elizabeth Olympic Park in Stratford, East London was used for the London Olympic Games in 2012. The park has also become a venue for outdoor learning for local primary schools. The initiative allows primary schools around the country to 'partake in free lessons for teachers who want to bring their pupils to learn on the park'. During summer time the London Wildlife Trust assist in delivering lessons to pupils (Queen Elizabeth Olympic Park). Figure 4.12 shows a class taking place in the multi-purpose Olympic park.

Figure 4.12 Queen Elizabeth outdoor learning

4.6.4 Summary

When considering the innovative teaching and learning environments cited above there are some slight limitations. Although purchasing and converting a double decker bus to create classrooms is innovative and cheaper than building an extension, there is still a cost implication. For schools that lack funding or for others with poor building conditions, any finance available may go towards maintenance. Central First School in Northumberland discovered their double decker bus classroom was only able to accommodate 15 students at any point in time. Few primary schools have the privilege of only lacking space for 15 extra students; the number of additional student spaces required is often more.

Some may argue floating classrooms and outdoor/park lessons are effective for delivering specific lessons that require imagination and an external environment. Not all classes have to be taught in a classroom and although there are limitations this is another practical solution to the lack of teaching and learning spaces in London and the South East.

4.7 Procurement methods

At this stage another solution to be discussed is the use of different procurement methods on primary school projects. Procurement is defined as a series of 'considered risks; each method has individual strengths and weaknesses which must be carefully calculated by clients and industry alike' (CIOB, 2010). Procurement is important as it has the potential to impact the quality, cost, time, design and material selection. Procurement routes also determine what responsibilities will be undertaken by the client, contractor or designer/consultants.

In a study about procurement influence conducted by the Chartered Institute Of Building (2010), 525 construction professionals were asked what was the most suitable and efficient procurement route for a project based on its value. The results can be seen in figure 4.13.

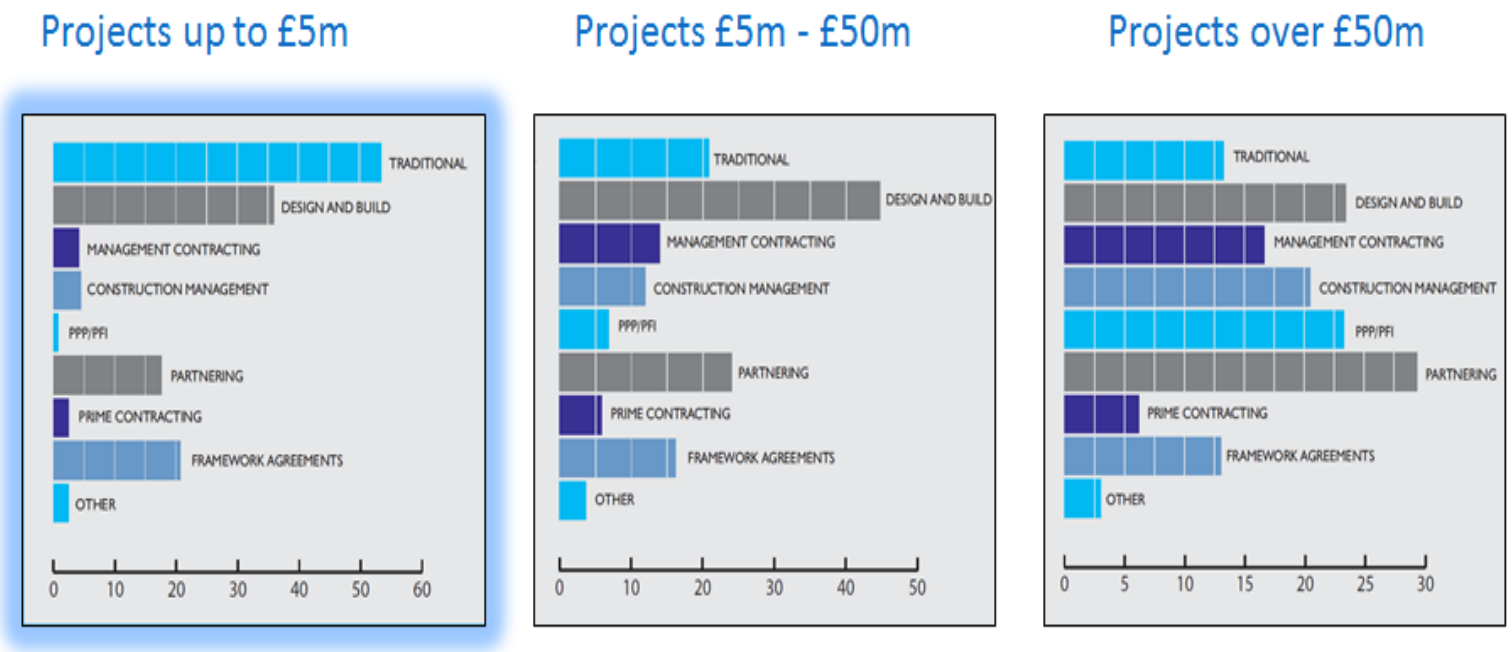

Figure 4.13 CIOB Procurement Influence

Figure 4.13 shows that for projects up to £5m the most suitable and efficient procurement route is Traditional contract; for projects between £5 - £50m it is Design and Build. For projects over £50m the most suitable and efficient procurement route is Partnering. Table 4.4 defines what these procurement routes entail.

Procurement route		
Traditional	**Design and Build**	**Partnering**
Traditional contract can be described as the separation of the design and construction process. The designer is responsible for design and the contractor for building, so responsibility for coordination of subcontract packages lies firmly with the contractor.	Design and Build is when risk lies greater with the contractor. The project is specified to be designed (at least in part) and built by the same contractor. Other parts of the design phase may be carried out by consultants hired by the client.	The principles of partnering include a decision making process, mutual objectives, and an overall improvement in performance. As more projects are worked on in tandem, a greater understanding of how to accomplish best practice, reduce costs and attain value for money is achieved.

Table 4.4 Procurement routes CIOB (2010)

The typical primary school without specialist facilities can be around the £5m mark depending on the number of forms per entry. Therefore considering the findings of the CIOB (2010) study; the traditional contract would be the most suitable and efficient procurement method to use on primary school projects. Using the traditional contract consequently should give the best value for money, reduce build time and ensure a quality finish.

In order to create more primary school places in London and the South East the correct procurement methods need to be applied from the outset. The South East award winning schools by HCC previously cited were all traditionally procured; there may just be a correlation between traditionally procured schools and excellent school places. Traditional contract is the most appropriate approach based on the findings above and thus using this method is another solution to the school places issue.

4.8 Village College Principle

History shows us that school buildings have served the U.K a great deal, not just by educating children but by bringing rural regeneration to communities. Henry Morris became the secretary of education in 1922 of Cambridgeshire, 'the third poorest county at the time' (Burton 1943). He founded 7 village colleges while in office. A village college was essentially a school that served the community. Henry described one college as being too much of a school and how it should be seen as having 'two wings or three courts: a school part, accommodation for adult activities with a village hall in-between' (Morris, 1925). Rural regeneration in impoverished communities is one of the biggest impacts the colleges made, which was achieved through the following:

- Workshop spaces where cultural country crafts (forging) could be practiced.
- Community services such as: adult education space, sport facilities, changing rooms, social provision (billiards).
- Boy scouts and girl guides, athletic and recreation clubs.
- A local place of education preventing families from drifting to the town and more able pupils to city schools.
- Welfare services such as libraries, child care and dental check-ups were encouraged.
- Achieving higher rates of adult unity through evening and day classes.

The village colleges are a prime example of just how powerful a school building can be and how far its influence can reach. Society has changed since the times of the village colleges however social issues such as poverty, crime amongst young people, poorly educated adults and lack of skills for the workplace are still prevalent. In perusing better school places, current and upcoming schools need to be empowered to take up the mantel of the village college philosophy and in whatever capacity possible serve and impact their local communities. Figure 4.14 shows a keep fit class in Impington Village College (1965).

Figure 4.14 Keep fit class Impington Village College

Impington College in figure 4.14 above celebrated its 75th anniversary in 2015. Many of the village colleges are now in multi-academy trusts and continue in their community spirit today (The Guardian, 2015). To summarise, governments could be convinced to build more schools and prioritise building conditions if these schools were also influencing their local communities. For these reasons clients, consultants and contractors should hold the community impact of the school building in higher esteem when working on primary school projects.

4.9 Community Schools

Village Colleges may not be as prevalent as they were but some modern schools are becoming more community focused. One of those community schools is Bygrove Primary School located in Poplar, East London.

The children and staff of Bygrove School had been learning and working in cramped classrooms and there was no other option than to build an extension. The design of the building was quite outstanding. New multi-purpose rooms were used to hold workshops and courses for parents, house an office for a full time home support worker and provide facilities for a Job Centre Plus facility as shown in figure 4.15.

Figure 4.15 Community facilities in Bygrove School

Figure 4.16 shows the external of Bygrove School, the BREEAM (Building Research Establishment Environmental Assessment Method) award winning extension was built by Lakehouse Contracts.

Figure 4.16 Bygrove Primary School

Schools such as Bygrove School do not just provide school places but positively impact their local communities. The use of the school premises after school hours is also a great source of external income which can be reinvested for future maintenance or extensions to the school, in order to accommodate for more children.

4.9.1 Summary

This chapter has thoroughly discussed several methods to approaching the primary school place shortages in London and the South East. In summary, the requirement for additional school places could be met by a range of the following solutions: pre-fabrication, better use of resources, correct procurement methods, innovative alternatives and community focused schools. The strengths and weaknesses of these solutions have been highlighted in some detail and in many cases the strengths far outweigh the limitations. In order for these solutions to work, mindsets and attitudes need to change. For example many people are used to pre-fabricated commercial buildings but not education buildings. Others are more traditional and prefer a costly new built school to converting an existing vacant building. The case studies discussed illustrate how each proposed solution is replicable and capable of addressing the school place shortages.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

The investigation of the study showed a real need for more school places in London and the South East. Case studies involving primary schools were used to investigate solutions to the lack of school places; the 9 case studies used are shown in table 5.1. In order to attain findings that were not ecologically limited in validity, case studies across the board of London and the South East were chosen. Therefore if the solution proposed was successful across all these areas it can be trusted to work elsewhere providing similar circumstances.

Primary School Case studies

South East	**East London**	**South East London**	**North West London**
Burnham Corpse Infant School Hatch Warren Junior School Woodlea Junior School Newton Leys Primary School Abacus Belsize primary school	Bygrove Primary School	Woodhill Primary School	The Village School

Table 5.1 Case studies

The solutions derived from the above case studies are displayed in table 5.2. As emphasised in the results and discussion chapter of this study these solutions have strengths and weaknesses. The focus should not just be on school places but maintaining quality school places as validated by the award winning south east schools; Burnham Corpse School, Hatch Warren Junior School and Woodlea Junior School.

Approaches to primary school place shortages				
Pre-fabrication	**Better use of resources**	**Innovative alternatives**	**Procurement influence**	**Community focused schools**
Partly or fully compartmental buildings sometimes combined with predesigned software which can reduce building time and provides quality school places.	Involving converting and refurbishing existing buildings rather than demolition for a new build. Also the use of rooftop playgrounds to save space that can be used for extensions.	The use of environments outside the school building such as parks, buses and boats.	Using the most suitable and efficient procurement route based on the value of the project, with the traditional method most appropriate for an average primary school.	Buildings that do not just provide a school place but through the use of multi-purpose rooms serve the local community.

Table 5.2 Approaches to primary school place shortages

The findings of this report show that the solutions detailed in table 5.2 will work, however the challenge lies with clients, contractors and consultants, as well as the construction industry's willingness to change methods traditionally associated with delivering school places.

In review of the solutions proposed in table 5.2, each solution will be discussed in turn in order to understand the various obstacles and challenges to be overcome, beginning with pre-fabrication. As indicated previously, typical attitudes towards prefabrication raise issues with lack of quality and the outward appearance of the buildings. It was discussed how pre-fabrication has really evolved and durability is no longer a problem. Woodhill Primary School demonstrated how aesthetically pleasing pre-fabricated buildings can appear with the use of external cladding to disguise the modular effect.

Regarding a better use of resources, the suggestions of solutions such as conversions and rooftop playgrounds raise questions regarding a lack of functionality and reduced safety. Putney Primary School depicted how buildings can be transformed and function as new primary schools. The Village School supported the idea that rooftop playgrounds are a practical solution and can be made safe for children.

Moving onto the topic of innovative alternations, school staff can be very conventional in their teaching methods. Innovative classrooms such as buses, parks and boats are a solution to overcrowded classrooms. It is time for teachers to be innovative and look outside the classroom environment, especially with the ever-increasing demand for primary school places.

Regarding the issue of procurement influence, it is interesting to note that many primary school building projects have been delayed, gone over budget and been finished with major compromises on quality. Despite this, there still seems to be no thought about the procurement route, which underpins the efficiency of the entire project. As discussed in the previous chapter, there are suitable and efficient procurement routes for projects based on value. If design and build teams used the most suitable procurement method for each primary school project, quality, time and cost-effectiveness could be maximised.

Finally, bearing the idea of community focused schools in mind; it is interesting to note that governments, local authorities and schools have been fixated on school buildings solely for the purpose of providing a place of education for so long. However a school building can be so much more than this, as illustrated with the Village College Principle and Bygrove primary school. London and the South East need schools that will impact local communities as well as provide adequate school places.

If this study was to be repeated more than 9 case studies would be used to solidify the findings. Although primary school places in London and the South East are severely lacking, research could be extended to include primary and secondary schools across the whole U.K. The findings of the NAO (2013) on local authorities' solutions to school places presented prior in chapter 2 would be investigated further to compare the effectiveness of school organisation, accommodation solutions and non-accommodation solutions.

There are many factors that influence school places and school building conditions that this study could have explored further. Governmental funding and programmes was touched upon however without funding none of the solutions presented in this study can be implemented. The construction industry cannot directly increase funding for primary school projects however through research and collaboration governments can be persuaded to release the funding necessary to implement these innovative approaches.

Future recommendations of work include:

- Investigating how to improve primary school building conditions and minimise unnecessary maintenance design and cost.
- How the design and build contract influences clients, contractors and consultants decisions on the quality of school places.
- The effectiveness of the priority school building programme and the future of education system in the U.K.

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