ABSTRACT
Recent demographic, economic and political trends have placed the issue of school size at the heart of school effectiveness and efficiency discussions. The subject of school size is particularly salient in remote and rural areas where the viability of small schools has been questioned. In spite of the relevance of school size policies, the literature on this issue is quite fragmented with few studies taking a comprehensive view on the implications of school size policies. This literature review attempts to bridge different strands of relevant research and describes existing country practices in order to provide a broader picture of the benefits and costs associated with different school sizes. The paper describes the different trends that have affected school enrolment and how different countries have managed school size policies, with a particular focus on school consolidation. It discusses the consequences of school consolidation and the alternatives to consolidation when schools are facing declining enrolment. It also reviews the different mechanisms through which school size affects the quality and efficiency of schools, and the existing empirical evidence on these effects.

1. INTRODUCTION

The question of what makes schools effective has been a frequent concern in educational policy literature. School size is one of many factors that can affect school quality, and a widely researched and debated topic in the literature. Practice and research show that there is no ‘one-size-fits-all’ recipe for creating effective schools, and this is also the case for school size. Moreover, school size policy is a salient issue that attracts the attention of policy-makers, school reformers, parent groups, community organisations and professionals. School size can become a sensitive issue, especially when size policies entail the restructuration or closure of schools. As a consequence of consolidation students are relocated to another school (or a new school building) (Howley et al., 2011). However, large school size cannot be achieved in all contexts. In some situations school consolidation or restructuring can be very problematic or even unfeasible. Increasing school size can be considered a policy option in densely populated areas with more than one school in them. In these situations, it should be possible to reorganise or merge schools. However, in areas with low population density, increasing school size may not be an option for policy-makers. This is the situation in many rural and remote areas, where schools facing declining rolls do not have the possibility of attracting more students, and where consolidation may be problematic for different reasons such as travel distances and lack of adequate facilities.

2. METHODOLOGY

The literature addressing school size policies is very extensive and covers a variety of issues, from a strict evaluation of the effects of school size (measured by the number of students per school) on a set of performance measures, to a wider contextualisation of school size policies into recent demographic trends or practices of school closure. Variation in school size is frequently related to variation in contextual factors, as well as to varying composition of the student and teacher population. This impedes disentangling school size effects from selection effects. When possible, researchers have attempted to analyse longitudinal data, implement value-added models, or study exogenous shocks to school size to eliminate some of these potential threats, but most studies are based on observational data and correlational analyses.
The challenges to school size research also arise from the difficulty of quantifying all of the costs and benefits of these policies, given that most of them are strictly non-monetary. Researchers face the challenge of measuring school outcomes in a context where school size policies are very likely to generate externalities that affect the local community beyond the school. The poor measurement of school outcomes is manifest in the frequent reliance on average text scores or graduation rates. The measurement of costs also faces considerable challenges.

3. TRENDS AFFECTING SCHOOL ENROLMENT

The demand for schooling varies across countries and regions, but economic, demographic and social developments in the last decades have particularly shifted the demand towards urban areas, whilst rural and remote areas have increasingly faced declining student rolls. These exogenous forces have raised the issue of consolidation in many rural areas.

The benefits of larger schools were usually affirmed by research conducted during 1930-1970, and the last major report favouring larger sizes for districts or schools appeared in 1970 (Howley et al., 2011). After that, studies conducted in the 1980s and 1990s indicated that there were limits to the benefits of larger schools, and that smaller schools also reported academic and social benefits (Stewart, 2009).

In Norway from 1950 to 1970, the number of primary schools in rural municipalities was reduced to less than a half (Solstad, 2005). School closure and consolidation also dominated rural schooling in Canada for most of the 20th century (Mulcahy, 2009). School closures were also frequent in some Eastern German regions in the 1990s, where one third of schools closed, in parallel to a 60 percent decline in the overall student population in primary schools (Budde, 2007). The number of small schools was also reduced in Sweden and in Greece during the 1990s and 2000s (O Slatara and Morgan, 2004).

However, in recent decades, the trend for consolidation has reversed in some areas, where small schools have emerged as a favoured reform model in urban communities. Due to evidence in support of the social and academic benefits found in smaller schools, based on large-scale studies from the late 1980s and early 1990s, a range of researchers and educational leaders are calling for policy makers to create an environment that fosters smaller schools (Stewart, 2009).

4. HOW SCHOOL SIZE INFLUENCES SCHOOL EFFECTIVENESS AND EFFICIENCY

Arguments for consolidation and larger school size stem from two presumed benefits of larger schools: first, larger schools promote better quality teaching and learning and, second, they do so at lower costs than smaller schools, that is, larger schools are more economically efficient. The literature on school size and consolidation has developed quite separately for these two issues. While some scholars have focused on the effects of school size on student outcomes (effectiveness studies), others have placed a larger emphasis on how size relates to schooling costs while keeping student outcomes constant or even improving them (efficiency studies). However, school size is a debated and controversial issue, and the purported benefits of larger schools are questioned by some studies. Moreover, it is likely that larger school size will trigger negative effects on some aspects of quality and costs of schooling, even if the overall effect remains positive.

4.1 The effects of size on school effectiveness

School size may affect students’ academic outcomes through its influence on: the quality and the breadth of the academic curriculum offered, the possibility to implement ability streaming, students’ attitudes towards learning, the possibility to implement single-grade grouping of students, the offer of special needs education, students’ attendance and dropout patterns. School size is also likely to affect other non-academic aspects of students’ lives and the learning environment, which will ultimately have an impact on students’ outcomes and school effectiveness. Such is the case of social behaviour and students’ well-being, involvement in
extra-curricular activities, the links to the surrounding community and the family, students’
attitudes, and the interpersonal relationship between students and teachers outside the
classroom.

4.1.1 Effects on students

One of the most consistent claims in the literature on school size is that larger schools provide
students with a broader range of subjects to choose from, including specialised courses, and
that this improves student outcomes (Barnett et al., 2002; Bradley and Taylor, 1998; Cotton,
1996; Iatarola et al., 2008; McVicar, 2000; Meyer, 2000; Leithwood and Jantzi, 2009). However,
ot all scholars agree on this beneficial effect of size on curriculum variety. A small school that
focuses on a few core and high quality courses can also achieve high student outcomes, and
much of the material covered in specialised courses in large schools can also be taught at
regular courses in small schools (Slate and Jones, 2005). Moreover, increases in size do not
simply entail a broader range of subjects available. A closer examination of the research
indicates that there is no reliable relationship between school size and curriculum quality, and
that the strength of this relationship decreases as schools become larger, i.e. there are
decreasing marginal returns to school size on this specific matter (Corbett and Mulcahy, 2006).
Smaller schools with a narrower curriculum emphasising core academic outcomes may help
achieve more equitable results for all students (Nguyen et al., 2007).

Student grouping

School size has an impact on the extent to which schools are able to group students into single-
grade groups or into homogenous groups according to their ability or age, both of which, in turn
impact on students’ learning environments. Very small schools usually do not have sufficient
students to implement single-grade grouping, and, frequently, only larger schools are able to
implement ability streaming among their students (Bradley and Taylor, 1998; McVicar, 2000;
Nguyen et al., 2007). Hence, school size has a direct effect on the organisation of students into
learning groups. The literature on this matter has debated extensively whether some forms of
organisation (such as ability- streaming or multi-grade teaching) promote better student
achievement than others.

Some research has emphasised the benefits of large schools in permitting ability grouping, and
hence the formation of homogeneous groups based on students’ achievements, which are
supposedly easier to teach (e.g. Bradley and Taylor, 1998). Other scholars have argued against
ability grouping and in favour of smaller schools, by arguing that tracking in larger schools would
involve ethnic and class segregation (e.g. Nguyen et al., 2007).

Single- versus multi-grade grouping is a salient issue in the school-size debate. Small schools
with multi-grade classes can be found in most countries around the world, and in the early
2000s they represented between 21% and 53% of classes in European countries (O Slatara
and Morgan, 2004). Sörlin (2005) indicates that in Sweden, for instance, the method of teaching
in mixed age groups has become a trend even in large central schools.

Multi-grade teaching is frequently presented as a tool for promoting independent and
individualised learning by enhancing students’ self-reliance, but also as a form of organisation
that provides opportunities for students’ social development and peer- and cross-age learning
and cooperation (Johnson et al., 1985; Little, 1995). However, as multi-grade teaching
frequently appears in the context of school size reduction and population decline, the special
needs and requirements of multi-grade schools are rarely recognised by educational authorities.
As a consequence teachers and administrative staff usually lack the resources and knowledge
to work effectively in this environment.

Students’ attitudes towards learning

Students’ attitudes towards learning and motivation for achievement are expected to be more
positive in smaller schools (Cotton, 1996; Iatarola et al., 2008). In small schools, teachers and
students have a closer relationship, and the former are able to respond to the individual needs
of students. Teachers, parents and the students themselves tend to have higher academic
expectations (Cotton, 1996). The individual attention and the recognition of merits achieved can
also increase the motivation for achievement. Cotton (1996) claims that smaller schools are especially beneficial for low socioeconomic status and minority students. Duncombe and Yinger (2001) indicate that in small schools it is easier for the personnel to identify and assist students at risk of dropping out. Notwithstanding these theoretical claims, Leithwood and Jantzi (2009) argue that evidence on this matter is meagre and the results from prior research remain inconclusive.

Attendance and dropout rates
Cotton (1996) found evidence in the literature (mainly conducted in the United States) that smaller schools are associated with higher attendance rates, and that students who change to smaller schools improve their attendance. Another important factor to be taken into account is that school dropouts and truancy may increase in rural and remote areas in case of consolidation, especially if transportation time is high or convenient transportation means are absent (Bard et al., 2006). Hence, an unintended outcome of consolidation may be an increase in dropouts (Slate and Jones, 2005).

Social behaviour and students’ well-being
One of the comparative disadvantages of larger schools frequently mentioned in the literature is that they may suffer from management difficulties and problems with discipline (McVicar, 2000). In small schools, teachers typically know students more closely and can identify possible discipline problems, which can be more easily and quickly addressed before they reach a crisis stage (Nguyen et al., 2007).

Another advantage of smaller schools in relation to discipline issues is that there are fewer students to monitor (Nguyen et al., 2007). Evidence from prior research also indicates that discipline problems increase as rural schools increase in size due to consolidation (Slate and Jones, 2005).

In larger schools, when discipline becomes a major concern, administrators tend to implement more restrictive and disciplinary actions (Meyer, 2000), which have been associated with higher dropout rates (Slate and Jones, 2005).

Links to the surrounding community
One of the most frequently mentioned advantages of smaller schools is that they forge stronger links with the school’s surrounding community, including the parental community. In smaller schools, teachers and students are more likely to interact frequently with parents and other people outside the school, and this creates a stronger climate of cooperation between teachers, parents and peers. Smaller schools are in greater physical and psychological proximity to students’ homes (Slate and Jones, 2005), and frequently have less formalised rules and procedures, which promotes a flexibility that facilitates the interaction of teachers and administrators with the parental community (Andrews et al., 2002). Also in smaller schools, parents have a better perception of the impact of their engagement in school activities, which may remain unnoticed in larger schools (Andrews et al., 2002). The stronger links between the school and the parental community are expected to enhance students’ outcomes. A special feature of very small schools is that they may benefit from implicating the local community in learning activities. The larger distance to the school organisation and to decision-makers makes interaction more costly and reduces parental attempts to take part in school activities (Berry and West, 2010; PSBA, 2009; Strang, 1987).

Students’ attitudes
The closer ties between smaller schools and their surrounding communities relate to another positive feature of small schools: students are likely to show a stronger sense of belonging in these schools. With fewer students, teachers and administrators typically know all students personally and can give more personalised attention to them. It is less likely that a student will be unnoticed or unattended (Cotton, 1996; Iatarola et al. 2008). In large schools problems of student and teacher alienation can result in more frequent discipline problems (Meyer, 2000). The benefits of small schools are especially evident for younger children in the early years of schooling, when the transition from home to school takes place (Ornstein, 1990).
4.1.2 Effects on teachers and administrators

**Teacher specialisation**
Having a larger number of students and courses, larger schools also allow for teacher specialisation. Whilst in large schools teachers could potentially choose the classes they teach, in smaller schools they will often be obliged to teach a wider range of subjects, hence reducing the benefits from specialization (McVicar, 2000). In large schools teachers can even choose to teach specialised courses within subjects (Bradley and Taylor, 1998).

**Teacher satisfaction**
Prior literature reviews have found that teacher satisfaction tends to be lower in large schools (Cotton, 1996; Slate and Jones 2005). This difference may be related to discipline problems and a more negative environment prevailing in larger schools (Bradley and Taylor, 1998). Another common argument in the literature is that there is a higher degree of cooperation among teachers in small schools (Cotton, 1996; Leithwood and Jantzi, 2009; Slate and Jones, 2005).

4.1.3 Issues affecting rural and remote areas, with implications for effectiveness

In addition to the advantages and disadvantages related to school size, schools located in rural and remote areas display special characteristics that may have an effect on student performance and that do not just depend on the size of the school in itself, but also on its geographical isolation. For this reason some of the implications of school remoteness on students’ outcomes will be treated separately, as they are a consequence of both smaller size and distance to other schools.

**Professional development for teachers**
Teachers in remote schools generally showed greater need for opportunities to attend conferences (Reading, 2009). This issue is especially pressing if one considers that initial teacher education may be insufficient for teachers in remote schools, because instruction is mostly focused on practices pertaining to larger schools. Hence, professional development is unavailable where it is most needed (Koulouris and Sotiriou, 2006).

**Teaching staff shortage**
Another frequent concern in small remote schools is teacher shortage and lack of continuity of teachers. Different scholars have found that fewer teachers want to serve in rural and remote areas in different countries (e.g. Greece, Hungary, Iceland, Korea or Canada) (Horn, 2006; Im, 2009; Koulouris and Sotiriou, 2006; Moulton, 2001; Mulcahy, 2009; Sigbörsson and Jónsdóttir, 2005).

As a consequence of the disincentives to teach in smaller rural schools, and the rotation of teachers, teachers with larger experience and better credentials tend to concentrate in city and town schools (O Slatara and Morgan, 2004; Iatarola et al., 2008). The arguments presented so far indicate that there can be benefits in terms of effectiveness for both large and small schools. It is hence difficult to ascertain overall whether the advantages or the disadvantages to size prevail. Initially, research reported greater effectiveness in larger schools. However, later research found many benefits to smaller sizes. It is necessary to analyse empirically whether the advantages or the disadvantages to larger sizes prevail, and how different mechanisms interact.

In spite of the different benefits that both larger and smaller schools entail, there is a consistent claim that smaller schools may be better able to close the achievement gap between students from different socioeconomic status. Small schools tend to promote a positive environment characterised by tight community links and personal attention to students’ needs that are especially beneficial for lowsocioeconomic status and minority students. Moreover, some of the main positive advantages of size, namely subject specialisation and choice, seem to mostly benefit students showing already better performance and coming from advantaged socioeconomic backgrounds. Hence, small schools may be a tool to narrow the gap between
students from affluent and poor communities. In practice, evidence indicates that smaller schools can counteract the effect of poverty on student achievement (Howley et al., 2011; Howley and Howley 2004). Howley and Howley (2004) found that increased school size favoured middle and upper class students (with an effect equivalent to an extra 0.25 years of schools) while it negatively affected low social class students (with an effect equivalent to a loss of 0.67 years of school).

### 4.2 The effects of size on school efficiency

One of the most common arguments in favour of larger school sizes, which is also frequently mentioned as a reason for consolidation, is that larger schools are more cost-efficient than smaller schools. The main reason for efficiency increasing with size is that schools face economies of scales, so that larger schools can reduce costs while maintaining their effectiveness or even improving it. Nevertheless, larger school sizes usually come with certain difficulties and changes that can actually increase schooling costs.

#### 4.2.1 Capital costs

In terms of scale economies in capital spending, larger schools (and also larger school districts) may benefit from price benefits of scale, i.e. the necessary resources can be purchased at lower unit costs when bought in larger quantities by negotiating bulk purchases of equipment or facilities, and by influencing producers (Duncombe and Yinger, 2001; Louis and McNamara, 1973; Tholkes, 1991). Hence, an investment in equipment made in large schools may result in lower unit costs than in smaller schools. Larger schools can also face scale economies owing to indivisibilities or the use of facilities to greater capacity. For example, savings can be obtained from the use of fewer buildings (Meyer, 2000). Scale economies also arise from the possibility of specialisation. Larger schools can invest more widely in facilities such as libraries, computer rooms, laboratories and sports facilities, when there are a sufficient number of students to efficiently utilise these specialised facilities (Andrews et al., 2002; Bradley and Taylor, 1998).

#### 4.2.2 Operating costs

The opportunities for scale economies present in capital spending also affect operating costs (such as salaries for staff and instructional aides, and costs of administration, maintenance and operations). Larger schools can benefit from bulk buying and acquire more material supplies per student to lower unit costs (Andrews et al., 2002; Bradley and Taylor, 1998; Louis and McNamara, 1973).

#### 4.2.3 Capacity Utilisation Rate

Another source of savings for schools are changes in capacity utilisation, but these do not depend on school size, rather on whether schools are operating at full capacity or suffer from under-utilisation.

#### 4.2.4 Transportation costs

Offsetting the benefits from scale economies and high capacity utilisation are transportation costs and possible increases in salary costs. These are frequently mentioned as the main disadvantages of school consolidation and merger in terms of costs. Consolidated school districts and schools have to confront higher transportation costs since students and staff have to travel longer distances to reach the schools (Andrews et al., 2002; Duncombe and Yinger, 2001). Nevertheless, many studies fail to include transportation costs in their analyses, which leads to a bias towards overstating scale economies. Holland and Baritelle (1975), who include transportation costs in their analysis of consolidating districts, point to another flaw of existing research: it often fails to include the opportunity cost of commuting time. The value of children’s
commuting time would reduce the savings available from consolidation. Transportation is, surprisingly, one of the most understudied issues in the consolidation debate (Corbett and Mulcahy, 2006).

The communities experiencing school consolidation often cite increased bus ride time as one of the most problematic aspects of consolidation (Killeen and Sipple, 2000). Besides the cost of transportation, longer commuting time may negatively impact students' lives by increasing fatigue, reducing attentiveness in class, or reducing the time available for recreational activities and interaction with the family. Additional disadvantages are caused by transportation schedule arrangements that do not allow students to participate in extra-curricular or sport team practices (Corbett and Mulcahy, 2006). Long commuting time, unaffordable or unsafe transportation options could even increase the risk of dropping out of school, especially for those individuals who expect lower returns from education (Berry and West, 2010).

4.2.5 Staff costs

Another important source of increasing costs in schools after consolidation are teachers’ and staff payrolls. Consolidation provides teachers and unions with comparison groups for collective negotiation, thereby making it more likely that salaries and benefits will level up to those of the most generous consolidating school or school district where teacher unions or associations have leverage in salary negotiations (Duncombe and Yinger, 2001; PSBA, 2009). This upward shift in staff payrolls is less likely to occur in settings where salary structures are more rigid and less subject to collective negotiation. Another reason for an increase in payroll costs could be that (depending on the specific regulation) postconsolidation layoffs will probably occur among the least senior people, and those who remain will tend to be higher on the salary structure (Duncombe and Yinger, 2010).

4.2.6 Reduced competition between schools

Lastly, there is one aspect that may affect the efficiency under which schools operate: the number of schools. Facing a constant demand for schooling, school size and number will be intrinsically related, i.e. a choice for smaller schools entails a larger number of them. Kenny and Schmidt (1994) argue that a larger number of smaller schools is more desirable than a few large ones because these circumstances will allow a school choice matching parental preferences. Broader choice implies more competition among schools for students, which is expected to lead to more efficient provision of education.

4.3 Effects of school closure and consolidation on the surrounding community

An efficiency analysis of school consolidation, closure or merger should consider the non-educational impacts of schools as possible costs or benefits of consolidation. Some of the effects that have been covered in the literature are: the implications of schools on social capital and community cohesion; the use of school facilities as a centre for non-school activities; and the impact of schools on the community’s economy.

Social capital

Schools, especially in small rural and remote areas, are a source of social capital and community cohesion. Schools act as a meeting point and a place for interaction and the forging of bonds within the community. Their impact is especially visible when students engage in community-based learning that serves the needs of the community while addressing the needs of students (Koulouris and Sotiriou, 2006). Schools play a crucial role in maintaining community cohesion, and also in maintaining and transmitting local history and culture (Berry and West, 2010). By providing a space for interaction and bonding and by promoting a community identity, schools increase the amount of social capital within the community, thereby facilitating cooperation and coordination for mutual benefit among community members (Nguyen et al., 2007).
Other services provided by schools
In rural and remote areas, schools frequently provide expanded services in their amenities. These activities can be related to education, e.g. in the form of a study centre for young people and adults, or a kindergarten, but they can also be used for other activities, as an information centre for municipal services, a workplace for very small businesses, a space for the organisation of local cultural activities, or a polling station (Sigsworth, 2005; Koulouris and Sotiriou 2006).

Impact on the local economy
Lastly, school consolidation and closure may have an impact on the vacated community’s economy. One of the claims in favour of maintaining small schools in rural and remote areas is that schools can have a positive economic impact by partly hindering the tendency of loss of young economically active adults through migration (Koulouris and Sotiriou, 2006). Moreover, it has been argued that consolidation may lead to lost taxes, declining property values and lost businesses (Duncombe and Yinger, 2010; Lyson, 2002; Meyer, 2000).

Scholars have found several advantages and disadvantages of size in terms of its implications for school effectiveness and efficiency. An estimation of optimum school sizes should take all these factors into account, as well as any other context, school and students’ characteristics that could mediate the relationship between size and school outcomes, or size and costs.

5. SCHOOL SIZE POLICIES IN RURAL AND URBAN AREAS

While there are advantages and disadvantages associated with different school sizes, school size will always be constrained by the number of potential students attending the school. As a consequence, creating larger schools will not be an option in certain environments where the number of potential students is very limited.

5.1 Country approaches to school size policies

While different countries have adopted individual approaches to the issue of school size, and specifically to the challenge of providing quality education in rural and remote areas, there are similarities in the policies implemented. In some countries the issues associated with small schools are more pressing than in others, simply because the number of such schools is larger. Scotland, Finland, Sweden or Norway are among the countries with a larger number of small schools in Europe (Wilson, 2008), and they have adopted different policies in this area. While some countries have accepted the higher costs of sustaining the quality of small schools in rural communities and isolated areas, others have carried out consolidation policies up to the point where further consolidation was no longer possible.

Norway and Sweden show resemblances in their experiences with small schools. Due to the geographical dispersion of the population in these countries, policy makers have accepted that in order to keep sparsely populated areas populated they will have to incur the higher costs associated to keeping quality education in rural and remote areas (Solstad, 2009). In Norway, with the population dispersed in fjords and mountain valleys, about 650,000 people live in peripheral municipalities, where travel time to a larger town or city is more than 45 minutes (Bonesronning and Rattso, 1994; Solstad, 2005). Due to geographical isolation.
In Sweden, similarly to what occurred in Norway, the price of sustaining rural community was accepted, but school reform in the 1990s granting local authorities more freedom actually increased pressure for school consolidation.
In Finland, as in Norway and Sweden, policy decision-making for the retention or closure of schools resides at the local level, and while some municipalities give a minimum number of pupils as guideline for the board of education, other municipalities evaluate the situation of small schools on a case by case basis (Syväniemi, 2005).
Rural school closures and consolidation were quite common in England during the 1980s and 1990s. However, in 1998 a legal figure was introduced to make the process of school
consolidation a more open process, and to only turn to school closure as the last resort: the presumption against the closure of rural schools’ (Perry and Love, 2013). In Scotland, approximately 20 percent of primary schools have school rolls below 50 students each (Wilson, 2008). As the Commission on the Delivery of Rural Education (CDRE) (2013) indicated, due to its geography there will always be a need for rural schools in Scotland. Very small schools are frequently located in rural and island areas, and the majority of them have stable or increasing school rolls (Wilson, 2008; CDRE, 2013). In Ireland there are more two and three teacher schools than in any other category, and multi-grade classes are common in the primary school system (Mulryan-Kyne, 2005). Although schools are mainly funded through a capitation grant based on the school roll, small schools receive a higher grant because no school receives a capitation grant based on fewer than 60 students (Mulryan-Kyne, 2005). In Ireland there is currently a ‘value for money’ review of small primary schools underway, because of earlier recommendations that schools with fewer than 50 students should be consolidated (Perry and Love, 2013). As in the case of Scotland, the government is considering creating a new category of school, that of ‘isolated schools’, to identify those schools in the most isolated communities (Perry and Love, 2013).

5.2 Policy options to confront declining rolls and disadvantages related to small schools

In recent decades, it has been a frequent concern for policy-makers to design education policies that take into account declining school rolls in rural and remote areas. The specific geographical location of these schools, and the relevance they have for their communities, make it difficult to come up with solutions to address the under-utilisation of these schools and to be able to guarantee quality education for students in sparsely populated areas. Given that school closure has severe consequences for students, school staff and the surrounding community, policy-makers and school leaders have resorted to other responses to the problems associated to small schools and have experienced with different forms of organisation and cooperation, such as school clusters, school federations, and more informal patterns of cooperation. Information and communication technologies have also provided new tools to offset the isolation of rural and remote schools.

5.2.1 School closure and consolidation

One of the most common responses to declining student rolls has been school closure and consolidation. There are different instruments through which authorities can create incentives for school and school district consolidation. One of the most common practices is to offer direct aid programs for consolidating schools, as well as providing building and transportation aid, to cover the capital investments and the changes in operating costs occurring after consolidation (Andrews et al., 2002; Duncombe and Yinger, 2010). Other incentives for consolidation may come indirectly from changes in the administrative structure of a country or region. In Iceland, for instance, the amalgamation of municipalities resulted in new larger municipalities, in some cases with several schools not very far from each other. This created incentives for local politicians to profit from economies of scale and close some schools down and transfer students to schools formerly belonging to a different municipality (Sigbórsson and Jónsdóttir, 2005).

When and where is consolidation more likely to occur?

Given the incentives and disincentives for consolidation, not all schools or school districts will be equally likely to embark on a consolidation process. Consolidation means that the schools that consolidate will lose control over the educational agenda, and that the level of educational provision may move away from the desired level of the two (or more) school communities involved (Brasington, 1999). Hence, schools (or school districts) with more similar desired levels of schooling will be more likely to consolidate; and this may partly depend on the socio-demographic characteristics of the different school communities (Brasington, 1999).
Other factors that affect the likelihood of consolidation are those related to transportation costs. A better highway and road network as well as shorter distances and fluid traffic flows between the communities to consolidate are likely to favour consolidation (Kenny and Schmidt 1994; Sell and Leistritz 2009). Communities or districts sharing borders will also be more likely to consolidate (Sell and Leistritz 2009).

5.2.2 School clusters

School clustering is a common response to the disadvantages associated with smaller schools. In some instances it appears as a voluntary form of cooperation and collaboration between schools, which is then extended to other municipalities or regions. Clustering brings together groups of small schools which, while maintaining their identity and their institution, choose to share resources, experience or best practices (Moulton, 2001). Schools in a cluster will maintain their institutions and establish formal links of cooperation with other institutions, sometimes sharing a common management or direction (Moulton, 2001). School clusters also implement a more horizontal management model, one that encourages peerlevel exchanges. Clustering has become the most popular approach to development and support in English primary schools. Moreover, in contrast to other countries with more sparsely populated regions, schools constituting a cluster are quite close to one another, often less than thirty minutes car drive apart (Rule, 2005). This allows for more frequent cluster meetings and exchanges between schools.

In Norway, some neighbouring small schools have organised themselves into formal clusters that pools material and human resources (Solstad, 2005). Due to the geographical dispersion of rural schools in Norway it is not always possible for teachers and students from different schools to meet on a regular basis, but where travel conditions permit, cluster schools include arrangements of direct meetings between the students from the different clustering schools (Solstad, 2005).

5.2.3 Use of information and communication technologies

In remote areas, where transportation of students to other schools is not possible, or where clustering is difficult to organise because of great distances between schools, some of the disadvantages of small size and remoteness can be partially overcome by the use of information and communication technologies.

For remote teaching and learning
Web-based or videoconference distance learning can be implemented with individual students or within groups, it may be synchronous or asynchronous and it can be based on one-way or two-way technologies (Hobbs, 2004). One of the main advantages of distance learning is that it can enrich the curriculum offered by small remote schools, allowing them to overcome the difficulties of providing specialised courses when the number of students and the supply of specialised teachers are scarce (Hobbs, 2004; Mulcahy, 2009).

One of the problems associated with distance learning is that the educational benefits that students assimilate from these programs may depend on the individual characteristics and motivation of students.

For professional development
Information and Communication Technologies can also be used to facilitate the professional development of teachers in remote areas and to reduce professional isolation. Primary and secondary school teachers in remote schools in Australia showed great needs in the areas of professional development, and the need to attend conferences (Reading, 2009). Cost-effective and convenient in-service education could be provided through a videoconferencing or web-based system (Broadley et al., 2009).

Difficulties and obstacles to distance learning
One of the biggest obstacles to implementing distance learning in rural education is the digital divide between rural and urban areas. Rural areas often have difficult access to broadband connection (Hobbs 2004). Often, those remote areas with most needs of strong link to broadband provision have the worst access (CDRE, 2013). The cost of providing the schools with the necessary technology and qualified personnel is another obstacle to the implementation of distance learning and teacher training. Schools interested in participating in this activity could also form a learning consortium partnership to share the costs of operations and to facilitate accessibility to a professional peer group (Hobbs, 2004).

6. EVIDENCE OF THE EFFECTS OF SCHOOL SIZE

6.1 Evidence for the relationship between school size and effectiveness

Given that there are a series of advantages and disadvantages associated to different school sizes, the overall impact of school size on effectiveness or efficiency is not apparent. For this reason, scholars and policy-makers have frequently researched into the question of whether schools size can maximize effectiveness or efficiency. Nevertheless, the results of these frequent enquiries are conflicting, and there is no ‘one-size-fits-all’ solution to the question of school size.

Educational researchers and policy-makers have attempted to measure school effectiveness through different operationalisations of outcome variables. The most frequently used variables are measures of the academic achievement of students (Slate and Jones, 2005). Some scholars have quantified the number or percentage of students passing certain tests, or the percentage of them attaining maximum scores in these tests; other scholars have also attempted to capture the distribution of results in these tests. Another common approach, especially in earlier research, has been to use measures of dropout rates or average daily attendance rates. In this research, small schools tended to show superior sticking power, with student attendance and retention rates significantly better in smaller than larger schools (Cotton, 1996; Leithwood and Jantzi, 2009; Slate and Jones, 2005). As shown below, one article has also addressed the impact of school size on labour-market returns to education (Berry and West, 2010).

As Slate and Jones (2005) indicate, it is important to take into account that the relationship between school size and school outcomes may be mediated by other variables, such as social class or school grade. In fact research indicates that size tends to have a differential impact on student outcomes depending on socioeconomic status. Students from disadvantaged backgrounds tend to achieve better results in small schools (Slate and Jones, 2005; Leithwood and Jantzi, 2009). Small schools are also associated with greater achievement for students of lower grades, while student outcomes of higher grades are maximised in larger schools. The literature indicates that elementary and middle school grades were more adversely affected by school size, while secondary school students may benefit from the advantages offered by large schools (Slate and Jones, 2005).

Bickel and Howley (2000) also investigated the effects of school size contingent on socioeconomic status. They found that smaller schools help maximise achievement for schools serving impoverished communities, and that larger schools serve the same function for more affluent communities (Bickel and Howley 2000). They performed a multi-level analysis with cross-level interaction effects that yielded an upper limit of about 250 students per grade for 9-12 high schools, and about 100 students for elementary schools (with these limits applying to communities where the poverty rate was set to zero). Their research indicates that larger schools in larger districts promote inequalities of outcomes in comparison to smaller schools and smaller districts (Bickel and Howley, 2000). Howley and Howley (2004) provide further evidence that small size yields an achievement advantage on all but the highest socioeconomic status students and that smaller size mediates the association between socioeconomic status and achievement. Moreover, they find that the relationship between school size and achievement is predominantly linear.

6.2 Evidence for the relationship between school size and efficiency
Similar to research on the effectiveness of schools of different sizes, enquiries into efficiency also show conflicting results. Many scholars and policy-makers have posed the question of whether larger schools can achieve the same levels of effectiveness as schools of smaller size but at lower costs.

As in the case of effectiveness studies, efficiency studies have mostly used achievement test scores to operationalise school outcomes. Other commonly used proxies for school outcomes are average daily attendance, and graduation and dropouts rates (Andrews et al., 2002). Most studies usually include operating and capital expenditure, and only very few attempt to account for transportation costs. Measures of cost also need to be included as regressors in cost functions to account for possible differences in cost structures across different schools or school districts, this is usually operationalised by teacher salaries, or staff hours per student (Duncombe and Yinger, 2001; Taylor and Bradley, 2000).

6.3 Implications of the research results

The evidence presented in the works reviewed indicates that size affects different schools in different ways. There is no educationally-relevant absolute lower or upper limit to school size; much depends on the context (Howley and Howley, 2004). Nevertheless, when considering issues of school effectiveness and efficiency it seems that the point of diminishing returns to educational outcomes occurs with fewer students than is the case for economic efficiency (Slate and Jones, 2005). That is, effectiveness-related research recommends smaller schools than efficiency criteria would indicate.

Even though initial research advised against smaller schools due to their limited curriculum and teacher specialisation, more recent results have shown that smaller schools with a strong required core curriculum could also produce students’ achievement at high levels. This later research has indicated that students did not necessarily register for the specialised courses or extracurricular activities offered by large schools, or that enrolment in these activities might be limited to specific student populations (Slate and Jones, 2005).

School size acts as a facilitating factor for other desirable or undesirable practices and features. Small schools may facilitate personalised teacher-student relationships, but they can also create professional isolation among teachers, or more reduced social networks for students. The advantages and disadvantages of size need to be evaluated against a specific context. Researchers and policy-makers should substitute the predominant question of “What size is best?” by the alternative “Best size for whom, and under what conditions?” (Bickel and Howley, 2000). The effects of size on achievement are conditioned by multiple factors, and one size is shown more clearly than ever before not to fit all cases (Bickel and Howley, 2000). This suggests that context and circumstances vary to such an extent from one school or school district to another that each setting can be understood as unique, and ought to be studied in its singularity.

Research has tended to overlook the interaction of school and district size with other characteristics of the schools or the student population. The effects of school size are usually construed as affecting equally all students. Socioeconomic background is one of the few moderators of school size effects to be found in the literature.

Large schools are considered to act more as a sorting mechanism for children, allowing students from socioeconomically advantaged families to profit from the advantages that larger size offer (Nguyen et al., 2007). In contrast, because staff in smaller schools can focus on a core academic curriculum and they know every student; small schools can offer success for each of them (Nguyen et al., 2007). For this reason small schools are likely to benefit children of lower socioeconomic status.

The level of education is another factor that has been considered as a relevant mediator of school size. Students in primary schools tend to be more adversely affected by larger sizes than students in secondary schools (Slate and Jones, 2005), which suggests that primary schools should be kept proportionally smaller than secondary schools (Howley and Howley, 2004). While schooling does seem to benefit from economies of scale (at least over a certain enrolment range), consolidation cannot be counted on to provide large cost savings in sparsely
populated areas (Holland and Baritelle, 1975). Creating large schools in rural areas with low population densities will increase the cost of transporting students, counteracting the savings from size economies (more so if the opportunity cost of transportation time is considered). Children’s and teachers’ commuting distance will place an upper limit to the true saving available from consolidation.

Educational decision-makers should keep the characteristics of their community and school in mind when examining school size policies. Authorities should take into account a wide range of factors before deciding on any changes in school size. Firstly, the educational benefits of changes in size should be considered, specifying which groups of students will benefit most and least from these changes. Next, travel distance and time as well as direct transportation costs are fundamental factors that need to be included in any assessment of likely policy effects. Other issues that need to be considered are demographic trends (in terms of population density, population projections) as well as any trends in community and urban planning or settlements. Financial and economic considerations should go beyond operating and capital expenditures and attempt to include, to the extent possible, the social costs of closing schools.

Limited available measures of costs
One particular limitation of the research relating school size to efficiency is the frequent use of average expenditure as a proxy for average costs of education. Economies of scale refer to the relationship between average costs and the quantity or level of services provided; it is a supply-side phenomenon (Fox, 1981). Even the availability of expenditure data is distant from what is necessary for these analyses. In most cases, school level expenditure data are not available, or available only for some categories of spending (Andrews et al., 2002).

Interaction effects
Researchers have tended to overlook the interaction of school size with other variables, whether pertaining to the individual characteristics of the student population, their parents or school specific characteristics. The only variables that have been treated in the literature as possible mediators of the effect of size, are the socioeconomic background of students (or social class), school type or grade. But if enrolment affects other individual characteristics, such as students’ attitudes, or degree of parental involvement in school activities, then this implies that the impact of student and parental characteristics on student outcomes are dependent on the size of the school. As a consequence, effectiveness, production and cost functions should include more interactions between student and parental characteristics and size (Andrews et al., 2002). Interactions between size and single-parent households or parental education provide examples of such cases.

7. CONCLUSION

Size is a salient issue that frequently raises debates and confrontation between policy-makers and stakeholders. Even if consolidation has usually been met with opposition by local communities, an analysis of the literature indicates that there are also benefits to consolidation and that initial opposition can be overcome. Even if there may be benefits to larger schools, such as broader academic curricula with specialised courses or a wider choice of extracurricular activities, these benefits can unequally affect student performance with some students benefitting more than others. This is also the case for consolidation practices. The benefits and costs of consolidation might be unequally distributed among those affected by it (students, teachers, parents) and it is fundamental to consider this distribution to reach a balanced assessment of the implications of school consolidation. Moreover, it is important to advance in the inclusion of transportation time and cost in studies on consolidation or school size more generally, particularly because this has been one of the main reasons for opposition to consolidation within the school community, but it has been frequently neglected in the existing literature. This is a factor that needs to be included in future research aiming to conduct a comprehensive analysis on the effects of consolidation.

One of the arguments that has appeared more consistently throughout this paper is that there is no ‘one-size-fits-all’ solution in school size policies. Even if consolidation may improve school
quality and efficiency in some contexts, it is unfeasible in others, mostly due to geographical isolation. Other alternative forms of organisation have proven effective in counteracting the disadvantages of small remote schools, without having to remove the school institution of its community. School clusters and school federations, and other more informal forms of cooperation, have allowed smaller schools to obtain specialised teachers and courses, to organise larger groups of students for certain classes, and also to create a wider professional community for teachers and principals. For those cases where interaction with other nearby schools is unfeasible, information and communication technologies provide an innovative tool to combat isolation, and positive experiences of their implementation show that they could be a useful tool for very remotely located schools.

Any decision on changes in school size must be made carefully, and it needs to be exhaustive in including all of the mechanisms and variables that mediate size effects. In that respect, existing studies have insufficiently reflected on the possible interaction effects between size and other school and context related variables. Grade level and social class have proven to be two strong mediators of size effects. This indicates that policy-makers need to carefully consider which student populations will benefit or suffer from different school sizes. Changes in size policies should be conducted through an open and transparent process that permits the participation of the affected communities, and that clearly presents the arguments for changes in the school structure.