



What Works in Education?

Using Evidence to Improve Education

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Networks between schools for educational improvement: What practices are the most effective?

Georgeta Ion and Chris Brown

School networks emerge from the need to promote coherent interventions among centres and to share resources that contribute to educational improvement in general. The premise asserts that, if they work collaboratively, schools are more effective in using their organisational capacity and improving student learning outcomes [1] [2]. This evidence-based review researches the impact of working in school networks on students' educational results and explores what effects it has on improving teacher practices. Furthermore, the review analyses what conditions contribute to effectively implementing the networks and what the practical implications for educational policy and practice are.

“For too long, education has been subject to inertia and based on traditions, and educational changes have been grounded in unfounded intuitions and beliefs. The ‘What Works’ movement irrupts into the world of education with a clear objective: to promote evidence based policies and practices. [Ivàlua](#) and the [Bofill Foundation](#) have come together to push this movement forward in Catalonia.”



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Networks between schools for educational improvement: What practices are the most effective?



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Motivation

The creation of networks between schools has become increasingly popular in recent years. A variety of local or national initiatives have stimulated schools to consider different types of collaboration: from initiatives between groups of schools that have begun to work together around a topic of common interest to initiatives promoted by administrations or other educational agents that have exerted external pressure to motivate the centres to collaborate.

Regardless of the driving force behind this collaboration, in this review we understand a school network as “at least two educational organisations working together with a shared purpose, for at least a certain time” [3].

School network work arises from the concern for educational improvement, making human and economic resources, the circulation of knowledge and collective learning to respond to complex situations more efficient. School networks assume even more prominence in situations of socio-economic or social health crisis, such as the current one caused by the COVID-19 pandemic. During these crises, solutions are sought and proposals are shared to give a quick response to a situation that arises, which causes many unknowns and requires agile and coordinated actions.

School network work arises from the concern for educational, human and economic resources, the circulation of knowledge and collective learning.



There are many reasons that have motivated the creation and operation of school networks over time. Thus, networking came about in response to different needs:

- To offer the best education to students, including special attention to their social, health and psychological needs, responses that would not be possible from a singular or isolated activity. Thus, working in a network makes it possible to ensure **holistic attention to students' needs**, offer better training and enable them to face current social challenges [5].
- To ensure the **learning and professional development of teachers**, responding to their specific training needs in a coordinated manner and thereby helping to prepare them to make informed educational decisions [23].
- To allow educational centres not only to share professional and knowledge capital, but also **economic resources** and make effective use of them. For example, by sharing means such as access to information, technologies and materials, especially in times of crisis or austerity [5].

In our educational system, networks of centres have a long tradition and date back from the time of the Spanish transition to democracy with the Pedagogical Renewal Movements [4] to more recent initiatives promoted by the public administration, by educational centres and by private organisations (Red de Competencias Básicas, Xarxes per al canvi, Escola Nova 21 and others). These experiences constitute the first step in generating knowledge about how networking helps to guide educational teams in schools and administrations to:

- Create the structural conditions and ensure the necessary resources for an effective implementation of networks between the centres.
- Make informed decisions about the replication of the most successful practices and the horizontal (between schools) or vertical (between schools and the public administration) transfer of knowledge.
- Know what types of networks are the most appropriate to achieve the priorities set.

Despite the increase in working in networks, there is hardly any scientific evidence about its impact on different educational aspects. To move forward in this direction, this review synthesises the international empirical evidence of the effects that working in networks has between schools and on the educational results of students (development of their cognitive, socio-affective and behavioural skills). In addition, we will refer to other types of effects on the professional practice of teachers and the operation of the centre.

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What networks are we talking about?

There is a wide variety of school networks whose characteristics individualise them. By studying them we can identify their irregular, diverse and flexible character, respect and trust among their members and their horizontal and open nature, based on horizontal and mutual learning [4]. Though they are not completely synonymous, in the reviewed literature [3] [5] [6] [7] [8] [9] concepts such as school networks, associations, alliances between schools and educational federations are used, apart from the broader concept of collaboration between centres. They all encompass the entirety of the collaborative processes that are established between educational centres.

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When speaking of school networks, the existence of a wide variety of structures and processes is also considered. These can be informal and spontaneously constituted to give an agile response to a specific need, or they can be more formal, developing as a consistent series of defined structures and systematic processes.

School networks can also consider different educational levels. For example, the networks between primary and secondary schools can be local (geographically located in the same context) or they can be founded on the basis of philosophical or religious ideologies. Finally, they may have different objectives, depending on the intention jointly agreed by the participants in the network.

- Networks that help to **facilitate the mobilisation and dissemination of professional knowledge**. They promote the exchange of professional experiences, collaboration and the development of joint practices between different centres. This dynamic help to fill in knowledge gaps through experiences that have worked at other centres.
- Networks that facilitate **the sharing of human or material resources to carry out common projects**, which contributes to reducing possible inequalities in the distribution of resources and overcoming momentary difficulties.

- Networks that promote **complete and holistic treatment for vulnerable groups**, thereby contributing to facilitating inclusion and educational fairness. Collaboration allows schools to address the needs of these students through coordinated and coherent strategies to impart the curriculum.

To fully understand the impact of networks on the aspects mentioned above, we are interested in looking for evidence about:

- Networks whose objective is **to improve the educational outcomes** of students in terms of their cognitive, socio-affective skills or their behaviour in various contexts, especially in vulnerable contexts.
- Networks that seek **improvements in how the centres function**.
- Networks that are formed **according to different criteria**, for example by educational level (primary, secondary, etc.) or according to the students' academic outcomes (networks between high-performance and low-performance centres, etc.) or that are formed between centres located in different geographic areas.

The studies included in the review basically refer to formalised school networks, gathered under various concepts:

- **Federations.** These are school networks that bring together more than two centres in which some have a management structure especially created to respond to the objective set by the network.
- **Collaborations.** These are groups of centres that bring together more than two and that develop specific activities together without necessarily having common structures.
- **Associative networks and alliances.** Groups that bring together more than two schools and may include other external agents (NGOs, associations, parents, etc.).

Questions influencing the review

As mentioned in the previous section, education centres have different experiences of working in networks and each of them has specific aims. Improving the academic outcomes of students and their level of learning is only one of the objectives set. However, most school networks also consider other types of impact, such as the professional development of teachers and the improvement of educational organisations. In this review, we hope to answer the following questions:

- 1) How do educational networks influence students' outcomes in terms of improving their cognitive, socio-affective and behavioural skills?
- 2) To what extent does working in a network influence teacher practice?
- 3) What type of network increases its effectiveness on students and teachers?

Finally, we investigate which conditions for implementing networks assist their effective application and what the practical implications are for Catalonia.

Reviewing the evidence

Reviews and studies considered

Following the inclusion and exclusion criteria of the selected studies, this study is based on the reviews, meta-analyses and experimental studies systematised in Table 1, carried out mainly in the English-speaking world. As can be seen, four systematic analyses and six primary studies are included in the review (table 1). The former include a total of 90 primary studies whose results can be combined quantitatively. The sample of centres analysed in the empirical studies amounts to more than 2,000.

Table 1.
Description of the sample of studies included in the review

| Studies | Context | Type of study | Sample |
|---|----------------|---------------|---|
| Bell, Jopling, Cordingley, Firth, King and Mitchell (2006). | United Kingdom | SR | 14 studies |
| Bell, Cordingley and Mitchell (2005). | United Kingdom | SR | 19 studies |
| Atkinson, Springate, Johnson and Halsey (2007). | United Kingdom | SR | 39 studies |
| Krowka, Hadd and Marx (2017). | United States | SR | 18 studies from the United States |
| Chapman, Muijs and MacAllister (2011). | United Kingdom | RCT | 176 school federations and 176 control schools |
| Chapman, Muijs, Sammons, Armstrong and Collins (2009). | United Kingdom | RCT | 122 federations and 264 control schools |
| Keating, Kerr, Helen, Spielhofer, Lopes and Mundy (2011). | United Kingdom | QES | 3,902 students from 1,536 networked schools and 2,366 students from control schools |
| West, Ainscow, Wigelsworth and Troncoso (2017). | United Kingdom | RCT | 104 networked schools |
| Tuttle, Gill, Gleason, Knechtel, Nichols-Barrer and Resch (2013). | United States | QES | 41 networked schools |
| Chapman and Muijs (2013). | United Kingdom | RCT | 264 schools from 122 school federations |

Source: author's creation. Note: RCT = Randomised Controlled Trial / QES = Quasi Experimental Study / SR = Systematic Review.

The main results of the review are presented below regarding the impact of school networks on students' educational outcomes, teachers and the school organisation. Likewise, Table 2 has been prepared to expand the details of the networks analysed in the references of table 1. This second table follows the scheme of the theory of change of a public programme or policy [24] which implies providing information about its context, main activities, interactions and desired effects.

This section ends by detailing the aspects that characterise those school networks with positive effects on students.

How do the networks influence the students' educational outcomes?

The review shows that school networks have a positive impact on students' academic outcomes, especially those related to basic skills in mathematics and language [10]. Furthermore, there is an improvement in the outcomes of students in disadvantaged contexts that helps to close the gap between those students in vulnerable situations [13] [14]. Working in a network leads to improvement in the students' social and socio-affective skills, especially in the case of the vulnerable, which helps to improve their diversity and inclusion skills [11] [16]. A positive, albeit moderate impact is also observed in the development of interpersonal skills [17]. Even so, not all networks show important changes in terms of behaviours or positive values when the impact is rather moderate or low [14]. Finally, in some contexts working in a network is found to facilitate students' transition to secondary school [18].

To maximise their impact, the development of the networks should be complemented by a series of programmes both in each centre and in the network. In most networks, actions are proposed first for the student body by implementing specific activities for students from

In most networks, actions are proposed first for the student body by implementing specific activities for students from disadvantaged situations, by extending the school day or by personalising learning.



disadvantaged situations [12], by extending the school day [13] or by personalising learning with special attention paid to specific needs and interests [14]. And secondly, they are proposed for teachers, which involve participatory activities, such as workshops [12], face-to-face and online training [17], as well as leadership skills [14], attendance at conferences, lectures and preparation with experts [16]. Finally, there are networks that involve specific actions to consolidate school organisation, such as by fostering a collaborative and trustworthy culture and strengthening the exchange of knowledge between teachers and other professionals from different schools [15] [18] [23].

The results of the investigations carried out also suggest differential effects in different areas and suggest that there is stronger evidence (with a tendency to moderate) that collaboration can improve opportunities and help vulnerable groups of students. It is moderate in that the network is effective in helping to solve immediate problems and modest to weak in its effectiveness in raising teachers' standards and expectations.

Box 1.

The Knowledge is Power Program (KIPP) school network

The Knowledge is Power Program (KIPP) is a rapidly expanding network of public charter schools (at the secondary educational level) whose mission is to improve the education of students from vulnerable backgrounds. Currently, there are 255 KIPP schools in the US.

Schools that are part of the network are those that have a high level of autonomy (being comparable to private ones) and are subject to fewer rules, regulations and statutes than traditional state schools, but receive less public funds than those of the public system, generally a fixed amount per student.

KIPP is a programme implemented in this school network that aimed to support students from vulnerable socioeconomic backgrounds or traditionally disadvantaged groups, based on the premise that they often underperform compared to their peers on standardised performance tests in mathematics and language. This “achievement gap” is associated with negative educational and career outcomes, both in the short and long term. In particular, KIPP seeks to provide students with an “excellent education” through:

- High expectations: by creating a culture of support and personalisation of learning based on the student’s needs, abilities, and interests.
- Focus on character: by providing students with a strong academic foundation and the strengths of a well-developed character to succeed in the university and the world outside it.
- Highly effective teachers and leaders: KIPP seeks to empower educators to lead school teams and invest in training that helps them to grow as professionals.

The evaluation was carried out in the fourth year of implementation of the programme in the network and the students’ academic outcomes were analysed in the state assessments. The sample has been represented by a total of 16,000 students who attended 43 KIPP secondary education centres in 13 states and the District of Columbia. They were followed up on for the four years. The data have been compared with the data of those who had attended secondary education centres in the same school districts but were not from KIPP (control schools).

The study shows that students who attended KIPP schools scored statistically higher than those in control schools on all state math and language tests (effect sizes ranging from 0.05 to 0.36), and social and experimental science state tests four years after enrolment (effect sizes of 0.25 and 0.33, respectively). Additionally, KIPP produces similar positive impacts on tests that assess higher-order thinking. The estimated effects on measures of students’ attitudes and behaviour are smaller, but the study provides evidence that KIPP leads them to spend more time on homework (those enrolled in KIPP spend an additional 35 to 53 minutes doing homework at home compared to control schools). KIPP also increased student and parent satisfaction levels with their school. However, the results also indicate that those who had participated in the programme showed more undesirable behaviours, such as lying or arguing with parents.

For further information:

Tuttle, C. C.; Gill, B.; Gleason, P.; Knechtel, V.; Nichols-Barrer, I. and Resch, A. (2013). “KIPP Middle Schools: Impacts on Achievement and Other Outcomes”. *Final Report*. Mathematica Policy Research, Inc.

What impact do networks have on teachers and organisations?

Beyond the students, school networks have an impact on improvements in teachers and in the organisation of the school.

The impact that working in a network has on teachers is observed in the improvement of dimensions related to professional learning [10] [11] [12] [14] [15] [16], peer learning and the training of new teaching skills in the classroom [11] [12]. In addition, networks help to increase collaborative work and communication and interpersonal skills [18].

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Secondary but relevant impacts relate working in a network with the improved exchange of good practices [12], the general satisfaction of parents with teaching activity [14] and their involvement in school activity [17].

At the organisational level, networks contribute to the development of leadership skills [10]. Networks have an impact on the institutional structure and processes, since they increase the relationship with the community and the development of professional learning groups and produce changes in the management of the centre [18]. Other more specific effects include greater parental participation in defining objectives, evaluations and decision-making in school, as well as the tutoring programmes focused on them [17].

Table 2.
Evaluation of school network analysis programmes

| Study | Nature of the problem to be addressed | Activities involved | Impact on student academic outcomes | Other type of impact |
|---|--|---|---|--|
| Chapman, Muijs and MacAllister (2011). | Boost academic performance, promote inclusion and stimulate innovation. | Share staff and other resources, joint professional development, curriculum development, leadership and management. | Significant improvements in student academic outcomes. | School networks have an impact on the leadership and ongoing professional development of teachers. |
| Chapman, Muijs, Sammons, Armstrong and Collins (2009). | Boost academic performance, promote inclusion and stimulate innovation. | Share staff and other resources, joint professional development, curriculum development, leadership and management. | Improvements in educational outcomes in mathematics and language. | Impact on the professional learning of teachers. |
| Keating, Kerr, Helen, Spielhofer, Lopes and Mundy (2011). | Develop socio-affective and interpersonal skills. | The network brings together schools from different communities. Networks between schools, local authorities and NGOs. | Significant difference of 3.5 points in the development of the competencies of inclusion and respect for diversity. | Improvements in the professional development of teachers. |
| West, Ainscow, Wigelsworth and Troncoso (2017). | The "Challenge the Gap" network aims to improve the educational outcomes of students in vulnerable situations. | <ul style="list-style-type: none"> • Extracurricular workshops to exchange knowledge.. • Activities with disadvantaged students. • Share tools and resources. • Collaboration between teachers. | There are no significant differences in any educational outcomes in students from vulnerable areas. | Improvement in the professional development of teachers and in the exchange of good practices. |

Table 2. (cont.)

| Study | Nature of the problem to be addressed | Activities involved | Impact on student academic outcomes | Other type of impact |
|---|--|---|--|---|
| Krowka, Hadd and Marx (2017). | The “No Excuses” network aims to improve educational outcomes for traditionally disadvantaged groups and reduce the gap. | <ul style="list-style-type: none"> • Set high academic expectations for all students. • Increase the school day. | <p>Small effect on math skills: $g = 0.202$.</p> <p>Small effect on language skills: $g = 0.069$.</p> | Not measured. |
| Tuttle, Gill, Gleason, Knechtel, Nichols-Barrer and Resch (2013). | The “Knowledge is Power Program” (KIPP) network aims to improve the educational outcomes of vulnerable students. | <ul style="list-style-type: none"> • Personalise learning. • Include in the training program a series of values and psychosocial skills to be successful in college and in the outside world. • Train teachers to lead school teams. | <p>Small effect on math skills and medium on language: $g = 0.05$ and 0.36.</p> <p>Median effect in social science and science: $g = 0.25$ and 0.33.</p> <p>The impact on the behaviour and values of the students is moderate or low.</p> | Overall satisfaction of parents with teaching activity increases. |
| Chapman and Muijs (2013). | Improve educational results, social skills for inclusion and stimulate innovation. | <ul style="list-style-type: none"> • Share staff and other resources. • Joint professional development (and therefore improved professional learning), curriculum development, leadership and management. | No measures of the effect of the size are presented, but the findings suggest that there is evidence of impact on overall performance. | Not considered in the review. |
| Bell, Cordingley and Mitchell (2005). | Systematic review Improvement of student results, teaching practices and acquisition of skills. | There are no notable elements. | <p>Improvement in standard test results (high impact).</p> <p>Decrease in the skills acquisition gap between vulnerable and non-vulnerable students (weak impact).</p> <p>High impact on motivation, commitment and leadership skills.</p> | Improved teacher learning. |
| Bell, Jopling, Cordingley, Firth, King and Mitchell (2006). | Systematic review Improvement of student results, teaching practices and acquisition of skills. | <ul style="list-style-type: none"> • Collaboration among peers. • Training by experts. • Online and face-to-face meetings. • Participation in conferences and training sessions. | <p>Significant improvement in educational results, commitment, motivation, self-confidence and level of independence.</p> <p>Significant improvement in cognitive and social skills such as: problem solving, leadership skills, social and higher order thinking.</p> | <p>Improvement of the professional learning of teachers.</p> <p>Improvement of the school culture.</p> <p>Greater involvement of parents.</p> |
| Atkinson, Springate, Johnson and Halsey (2007). | Systematic review Improvement of student results, teaching practices and acquisition of skills. | Promotion of a culture of collaboration among the partners that make up the network. | High impact on improving student outcomes and transition to secondary school. | <p>High impact on the professional development of teachers and their socio-affective skills.</p> <p>High impact on school practice.</p> |

Source: author’s creation. g = Hedges estimator to measure the difference in means between the control group and the test group or between the pre-test and post-test results. The measurement of the effect is expressed as: Small Effect (SE): 0.2; Medium Effect (ME): 0.5; Large Effect (LE): 0.8.

What characteristics do networks have that help to improve student outcomes?

It is true that both the systematic review and the evaluation of school network programmes detect improvements in students' academic outcomes, in the practice of teachers and in schools. Where networks have a highly positive impact, there is a configuration of dynamically interacting components.

The objectives of the network

Wherever student learning and academic outcomes increased significantly, the networks had focused on specific, **limited and concrete** objectives, particularly those linked to improving their experience. Studies point to improvements basically in relation to students' academic performance, achievement and well-being.

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The size, scale and location

Size, scale, and geographic extent appear to have little to do with their effectiveness, which suggests that it is **the quality of collaboration** between teachers and stakeholders that makes networks work and have an impact.

Network duration

It is found that most networks **last for a minimum two years**, and it is from this moment that educational improvements in students, teachers and school organisation begin to emerge. There is a greater impact on networks that have been in operation for more than four years.

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Types of centres

The types of networks that generate the greatest impact on students are **those that are formed between high-performance centres that create alliances with other low-performance ones**. Furthermore, the networks that have the least impact are those made up of schools of different educational levels, such as primary and secondary. The impact is usually greater in alliances between schools of the same educational level, such as those between primary schools or only secondary schools. In networks that seek to improve the results of students from vulnerable groups, the impact on improving results in primary school is low or moderate and in secondary school it is low.

Network models

In general, all network models (between schools, schools and administrations or schools and other entities such as NGOs) have positive effects on students and teacher practices. The impact is greater in networks formed by schools and **local administrations**.

Box 2.

The “Federations of collaboration between schools” network

Federations are a form of collaboration promoted by the English government for the purpose of promoting reforms in educational centres, particularly in schools that require a “structural solution to deal with persistent low performance”.

Therefore, federations are viewed as an innovative strategy to transform education into clusters of schools, especially those with challenging circumstances, through activities involving the sharing of staff, resources, professional development, changes in the curriculum and in leadership and management systems

The term “federation” encompasses a broad spectrum of partnership agreements that is used to describe a variety of associations, groups and partnerships. In general, it describes groups of schools that agree to work together to improve educational outcomes for students, promote inclusion, find new ways to approach teaching and learning and build the capacities of their staff in a consistent way. The collaboration agreements are established by the Education Law of 2002. The law allows the creation of federations called hard federations, which have a joint governing body or a coordination committee between the centres that are part of the network. It also allows the creation of soft federations, which are those in which the centres delegate part of their powers to a commission with limited responsibilities. In any of these configurations, each school that is part of the network remains a separate entity that maintains its address, has its own budget and is subjected to the same inspection mechanisms. However, the schools in the network are recognised for their high levels of trust and collaboration, allowing them to establish strong working relationships to ensure a long-term impact and the successful achievement of their goals. More details about the federations, including the law that protects them, can be found on the government website [The School Governance \(Federations\) \(England\) - Regulations 2012](#).

During 2009 and later in 2011, studies were carried out on the networks’ operation. Specifically, the objective was to investigate how networks seek to improve student outcomes and the participating schools’ capacity for leadership. The study also explored the factors that facilitate the positive effects of the network and the characteristics that act as barriers to improvement. It was also examined whether some models are more effective than others in promoting better results. The 2011 study also aimed to detect areas of progress compared to the results obtained in 2009. For this reason, the same data analysis methodology was used, which consists of developing a sample made up of schools in the network and schools with the same profile that have not been part of the network (the control group). Thus, a selection of schools was created in each year and the academic performance of the students of the samples was compared in the standardised tests in mathematics and language (English). In addition, comparisons were made between the schools in the network and those in the control group to analyse the impact based on contextual variables (rural or urban) and student profiles. A sample of 50 local authorities was selected. A government agency was contacted and asked to identify the networks and the schools that were part of

Box 2. (cont.)

them. A total of 264 schools and 122 federations were identified in this way. The students' academic outcomes were extracted from the databases of said agency (in this case the Department for Children, Schools and Families [DCSF]). To analyse the information, multi-level statistical models were used to study the impact of the network on the students' academic outcomes.

The data led to the conclusion that networks can have a positive impact on student outcomes and that the impact is greater when the objective is to raise educational standards through the alliance between low- and high-performing schools. They also revealed that the schools in the network have better results than the schools in the control group from the second year of the programme. However, no significant improvement has been found in secondary schools. Despite everything, primary schools tend to have better results when they associate centres that share the same ideology (religious, for example) or the same funding.

One aspect to highlight would be the importance of the leadership of the networks. Strong management is a key characteristic in a network's success. For example, schools that have shared leadership show better results than those with a traditional one based on their own management team.

For further information:

Chapman, C.; Muijs, D. and MacAllister, J. (2011). "A study of the impact of school federation on student outcomes". Nottingham: National College for Leadership of Schools and Children's Services.

Summary: arguments in favour and challenges of working in a school network

This review basically focuses on evidence that comes from networks promoted through public initiatives. Although there are empirical studies on different ideas for promoting networks, these also tend to have their origin in collaborations initiated by the public administration. Although this aspect is not necessarily negative, the scarcity of studies carried out by the networks themselves or by the educational centres involved is striking.

Furthermore, the review highlights the multifaceted nature of the networks, which cover a wide variety of types of collaboration and involve centres of different types and educational levels. Likewise, schools collaborate for a multitude of reasons, for different periods of time, with varying intensity, and with different levels of success in terms of impact and sustainability. The evidence points to a series of positive consequences of working in a network, in relation to the impact on students, teachers, the improvement of schools and their organisational development.

The evidence analysed indicates an improvement in the students' educational outcomes and in the practice of the teaching staff, as well as impacts on the usual dynamics of the centres. Notable is the impact of the networks on the progress of the students' learning, especially in mathematical and language skills. Likewise, the impact on the development of socio-affective or interpersonal skills and progress in acquiring values linked to diversity and inclusion have been verified, although these aspects have been poorly measured. However, this does not mean that the networks have no impact on other aspects of student learning, although these have not been analysed in the current review.

The evidence analysed indicates an improvement in the students' educational outcomes and in the practice of the teaching staff, as well as impacts on the usual dynamics of the centres.



In relation to the aspects with positive results on the networks' effectiveness, working in a network is effective at all educational levels, with a slight advantage for primary education, among any type of centre and from any geographical context. Furthermore, we see that when the networks are made up of high-performing schools and low-performing schools, the positive effects in the latter are significant. Thus, we may conclude that networking has the potential to help to close the inequality gap and to support initiatives aimed at improving centres in situations of vulnerability.

Evidence is insufficient regarding the effect of networks on teacher practices. Even so, the impact of networks on professional learning is worth noting. Although no data are provided on the scope of the effect due to the difficulty in measuring this aspect, participating teachers are found to perceive improvements in their professional learning, in their teaching skills and in general satisfaction in all the networks.

The impact of permanent training on the improvement of students' educational outcomes is proven [26], which allows us to think that professional learning facilitated by networking has a moderating effect on the improvement of students' results.

In the following table (table 3), we briefly systematise the main arguments in favour and the challenges posed by networking based on the data that have been analysed.

Table 3.
Advantages and challenges of school networks

| Arguments for school networks | Challenges in the implementation of school networks |
|---|---|
| The evidence is clearer for the impact of networks on mathematical and language skills and moderate on socio-affective, interpersonal and other positive behaviours. | More studies are required on the impact of networks on the development of socio-affective and interpersonal skills. |
| They have an impact in the medium and long term. | Constant and continuous work is required so that the networks can produce the expected changes. |
| They help to solve specific problems and respond to clear objectives. | The evidence on the influence of networks in the development of teacher practices is moderate. |
| They promote improved attention to diversity and vulnerable groups. | Progress towards closing the gap in vulnerable students' learning is often difficult to measure, which leads to the need to provide more studies on this particular topic. |
| They contribute to curriculum development and create new opportunities for professional learning. | It is difficult to generalise the achievements of the networks and their application requires very careful contextualisation, adapted to the internal characteristics of each centre and the students' needs. |
| Networks that involve activities in the curricular field (increasing the school day and academic expectations, working on values and social skills) are more effective, particularly to improve the results of vulnerable students. | To be effective, networks require consistent actions in terms of sharing resources, leadership and common commitments. These organisational aspects pose a difficult task. |

Source: author's creation.

The review reveals several gaps in scientific knowledge about network collaboration. Most notable is the need for a consistent and comprehensive basis of the system in relation to the diversity and key characteristics of the networks. Specifically, it reveals a lack of research lines, for example: knowing the differential impact of networks and how different forms of networks can vary their effectiveness; analysing the criteria used in selecting participating schools and how this impacts educational results; what the most common guidelines are for developing and maintaining relationships between network schools or what would be the means by which administrations adapt to network collaboration.



Implications for practice

The synthesis of evidence on the impact of networking between educational centres reveals a series of implications regarding educational practice and policy and its applicability in Catalonia.

Before going deeper into each of them, we must stress that any educational measure or policy should take the evidence and good practices experienced in other contexts into account. However, to ensure the effectiveness and sustainability of the proposals, innovation or measure, the approach based on the transfer of good practices (policy borrowing) must be corroborated with a "learning from practice" approach [19], considering first of all the context and its determining characteristics.

Catalonia is part of a broad and consolidated collaborative educational culture. In addition, it has a system of school autonomy, which are two fundamental pillars and undoubted advantages of working in a network between schools.

Starting from both premises, the conclusions obtained from the previous review of the evidence allow us to issue some recommendations addressed to the educational administrations, the centres' management teams and the training entities:

1. In order for a network to function, the participating centres must share a clearly defined objective, a common interest or that they consider a joint activity to meet a specific training need. This means that the management teams of the centres must adopt **shared leadership**, agree on intervention strategies and ways of acting and obtain the support and commitment of the teachers involved. For this to happen, we must adopt **a management style open to collaboration** as an improvement strategy, which promotes trust among the teaching staff of the centre itself and in the centres of the network [20] [21].

In order for a network to function, the participating centres must share a clearly defined objective, a common interest or that they consider a joint activity to meet a specific training need.
2. The evidence shows that networks bring benefits for students, teachers and schools. Management teams and administrators must find ways to enhance these benefits.
3. The evidence indicates that the most effective networks are those that adopt formal guidelines and involve educational administration. **Management teams and administrations must help to create and maintain this type of network** and apply as an active partner in the network.
4. For robust results, the life of the network is important. This means that management teams that promote working in a network must make sufficient time available to their teachers to implement the planned activities and **sustain the networks' operation for a medium or long period of time** to be able to appreciate the results.
5. The evidence indicates that teacher training and professional learning are the vehicles for consolidating and operating networks. Administrators and management teams should support and **promote dynamics of mutual preparation and professional development** as strategic engines for the effectiveness of networks [20].

The evidence indicates that teacher training and professional learning are the vehicles for consolidating and operating networks.

In conclusion, it can be affirmed that networks by themselves have a positive but modest impact on educational improvement. In our immediate context, the review shows that collaboration and professional development are the vehicles that ensure knowledge transfer and that promote learning and professional progress. It is the role of politicians and school leaders to create the ideal conditions for this to happen.

Lastly, it should be emphasised that the results of the review must be viewed with caution since all the studies analysed refer to the English-speaking world. This may limit the study in reference to the potential for transferring the results to Catalonia.

This restriction is strengthened by the lack of evaluations of existing networks in Catalonia or in nearby environments and by the need to corroborate scientific knowledge with the experience derived from analysing local initiatives.

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