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# Bridges over the Atlantic: A Network Analysis of the Introduction of the Monitorial System of Education in Early-Independent Spanish America<sup>1</sup>

## 1. Of flows, relations, and networks

In recent years social network analysis has begun to make a tentative appearance in comparative historical research, especially in historical sociology. Although this approach is largely unknown in the field of comparative education, it has already proved a useful methodological tool in contributing to the explanation of similarities and commonalities between different historical processes. A distinctive trend in comparative enquiry has already shifted its focus from the mere contrasting of separate and separable entities to the study of the transmission of knowledge, models, and *imaginaires* across places, and their reception and individual appropriation.<sup>2</sup> Now, by focusing on the dynamics of processes of flow and circulation of people, ideas, objects, merchandise and capital across regions and continents, social network analysis may help to further illuminate the very communication processes that constitute that knowledge transmission: the channels through which information, people, and objects flow, and the ways in which such channels shape – or construct – whatever is being conveyed.

In broad terms, social network analysis examines the relations established between individuals, identifies patterns of relations, and studies the impact of such patterns upon local, regional, national or transnational processes of social change. In the social sciences the term 'social networks' has been widely used for several decades, but it has been mostly employed in a metaphorical sense. This article intends to embrace it in an analytical sense: here we will use social network methodologies as tools to shed light on the processes in-

<sup>1</sup> We would like to thank our colleagues from the Comparative Education Center at Humboldt University, Berlin, for reading previous versions of this work and providing constructive feedback. We are also very grateful to Thomas Manke, whose patient and friendly advice on the technical aspects of network analysis was extremely helpful to us, novices in this field.

<sup>2</sup> See, for example, J. Schriewer, Welt-System und Interrelations-Gefüge. Die Internationalisierung der Pädagogik als Problem Vergleichender Erziehungswissenschaft (= Humboldt-Universität zu Berlin, Öffentliche Vorlesungen, H. 34), Berlin: Humboldt-Universität zu Berlin, 1994.

volved in the introduction and early expansion of an educational innovation, the monitorial system of instruction in early-independent Spanish America (ca. 1818--828). Given the relative novelty of this approach in both the fields of history and of comparative education, this article is conceived of not as an extensive application of social network analysis to a historical phenomenon, but rather as an exploration of the possibilities of this approach for historical educational research, a reflection on its limitations, and, finally, an invitation for other scholars to delve into it as well.<sup>3</sup>

Our analysis is based on a substantial body of empirical research compiled over a number pf years, seen in the light of a selection of basic tools drawn from social network analysis. It is our first experiment using this methodology, and it is meant to serve as a first step for the analysis of a large bulk of data from a project that studies the expansion of the monitorial system all over the world.<sup>4</sup> However, far from endorsing a form of 'network imperialism' that treats network analysis as the only correct way of discussing social phenomena, we will instead use this kind of analysis as a complementary tool, a means to explain what, in our view, a conventional (non-relational) social, cultural or political approach fails to explain, in the concrete historical case we are concerned with.<sup>5</sup> In so doing, we are certainly aware of two of the strongest criticisms that have often been made against social network analysis: firstly, the lack of any adequate conceptualisation of how culture orients and constructs the relations and the rate and form of the flow within a network; secondly, the underestimation of the individual as a rational, decision-making subject – in which case no psychological make-up, motivations or competencies are attributed to him *a priori*.<sup>6</sup> We certainly do not attempt to

<sup>3</sup> Two comprehensive articles on the uses and potential of social network analysis in historical research are those of R. V. Gould, Uses of Network Tools in Comparative Historical Research, in: J. Mahoney/D. Rueschemeyer, Comparative Historical Analysis in the Social Sciences, Cambridge 2003, pp. 241-269 and C. Wetherell, Historical Social Network Analysis, in: International Review of Social History 43 (1998), pp. 125-144.

<sup>4</sup> Most of the empirical data has been gathered from primary and secondary sources by Eugenia Roldán Vera over the course of ten years, whereas the analysis and visual representations are the result of collaborative work of both authors, much facilitated by the IT skills of Thomas Schupp. This analysis will be applied for the data compiled within the project 'Nationalerziehung und Universalmethode: Globale Diffusionsdynamik und kulturspezifische Aneigungsformen der Bell-Lancaster-Methode im 19. Jahrhundert', funded by Deutsche Forschungsgemeinschaft (DFG) in the Comparative Education Centre at Humboldt University, Berlin, under the direction of Jürgen Schriewer and Marcelo Caruso.

<sup>5</sup> On 'network imperialism' see Gould, Uses of Network Tools (see note 3), p. 244.

<sup>6</sup> In the field of comparative education, this criticism has been formulated mainly by the Neo-Institutional school, especially in the works of D. Strang/J. W. Meyer, Institutional Conditions for Diffusion, in: Theory and Society 22 (1993), pp. 487-511.

incorporate these criticisms into the limited network analysis we undertake here, but we leave them for consideration in further research. For the purposes of this article, we simply assume that the actors involved in introducing the monitorial method did so because they perceived they had cultural commonalities with the centres from which the method emanated, and because they had a concrete political agenda that the method was understood to fulfil, among other factors. We also leave as implicit the fact that the method itself was interpreted as something reproducible, standardised, and which allowed for a homogenisation of teaching praetices, all factors which undoubtedly contributed to its appeal and the idea that it lent itself to universal distribution.<sup>7</sup>

In this article we experiment with standard, historically-informed analysis of the density and centrality of the network of communication and dissemination of the monitorial system, in order to advance an explanation of some of the features of its introduction and early implementation which until now have been insufficiently accounted for. These features are:

- the chronological simultaneity of the method's introduction in virtually all Latin American countries, during a period in which intercontinental communications were not generally fluid;
- the comparable velocity in the expansion of the method during the first few years of its implementation;
- the remarkable formal similarities between the processes of implementation during the first years of its introduction;
- the specific relevance of certain individuals and institutions involved in disseminating the method via other individuals and institutions; and

See also M. Emirbayer/J. Goodwin, Network Analysis, Culture, and the Problem of Agency, in: American Journal of Sociology 99 (1994), no. 6, and M. Callon, Actor-Network Theory – the Market Test, in J. Law/J. Hassard (eds.), Actor Network Theory and After, Oxford 1999, pp. 181-95.

<sup>7</sup> These are all concerns adequately raised by D. Strang/J. W. Meyer, Institutional Conditions for Diffusion (see note 6). We have chosen to deal with 'hard' network analysis separately from the study of the cultural issues that construct networks in a different one because for the time being we have not found a way to integrate both aspects in one sensible methodological strategy. For an analysis of how culture shaped the communication of the monitorial system between Great Britain, France and Spanish America, see E. Roldán Vera, Internacionalización pedagógica y comunicación en perspectiva histórica: la introducción del método de enseñanza mutua en Hispanoamérica independiente, in: M. Caruso/H.-E. Tenorth (eds.), Internacionalización: Semántica y sistemas educativos en perspectiva comparada, Barcelona (fortheoming) 2005, and E. Roldán Vera, Export as Import: James Thomson's Civilising Mission in South America (1818–1825), in: M. Caruso/E. Roldán Vera (eds.), Promising Imports: the Appropriation of Monitorial Schooling, Modern Politics and other Cultural Practices in Post-Culonial Eatin America, Frankfurt am Main 2005.

 the (network-related) reasons why the further expansion and consolidation of the method were so different in the various Latin American countries (assuming that an explanation in terms of networks is only one part of the explanation).

Traditionally, the introduction of the monitorial system in Latin America has been studied from almost exclusively national nerspectives, with the exception of a handful of comparative studies.<sup>8</sup> Yet the most superficial comparative look leads one to realise striking similarities between the different countries, as well as puzzling differences in terms of the life span of the method. Moreover, when we go beyond mere lists of laws and the numbers of monitorial schools created in the different countries and examine the local historical fabric that gave way to the emergence of such schools, we find not only similarities but also important connections between the various 'actors' involved. That is why, rather than studying the dissemination of the method in Spanish America as a sum of separate national processes leading to a historical confluence, a social network-analysis approach can better illuminate the ways in which the macro-historical or global processes were articulated at the local or micro-historical level. This integration of the macro with the microsociological level is indeed one of the promising aspects of network analysis; in fact, the ways in which this form of analysis highlights the role of individuals within a global network of possibilities have been understood by some as a mechanism capable of making the concept of social capital fully operative.9

2. The monitorial method in Spanish America

Well-publicised by its designers Joseph Lancaster and Andrew Bell, and by the missionary/educational British organisations that envisaged its expansion as a means of spreading both literacy and the Gospel, the monitorial method enjoyed during the first decades of the nineteenth century an unprecedented global appeal. Between 1810 and ca. 1830 this method which promised to educate large numbers of students under the gnidance of very few teachers, thanks to its mechanism of student teachers (monitors), was embraced in both pre-modern and industrial societies all over the world.<sup>10</sup> In Spanish America

<sup>8</sup> C. López/M. Narodowsky, El mejor de los métodos posibles: la introducción del método lancasteriano en Iberoamérica en el temprano siglo XIX, in: M. H. Cámara Bastos/L. M. de Faria Filho (eds.), A escola elementar no século XIX: o método monitorial/ mutuo, Passo Fundo 1999, pp. 44-72.

<sup>9</sup> D. Jansen, Einführung in die Netzwerkanalyse, Opladen 2003, p. 15.

<sup>10</sup> See J. Lancaster, Improvements in Education, London 1805, and A. Bell, An Experiment in Education, Made at the Male Asylum at Egmore, near Madras. Suggesting a System by which a School or Family May Teach Itself under the Superintendence of the Master or Parent, London 1805.

the method was particularly attractive because it suited the demands of the ideal of mass education that was formulated after the independence of those countries from Spain. There mass education was perceived as a constitutive element of the new republican, representative order (in which the authority of the State was underlain by the existence of an educated citizenry able to vote and be voted), and the monitorial method appeared to be the most suitable device to bring education to everybody in a short time and at low cost.<sup>11</sup> Yet, as we will argue, its appeal was not the only prerequisite for its widespread dissemination in the region.

The various histories of the introduction of the monitorial method in Spanish America report that it was first implemented around 1818 in the Río de la Plata region, and by the end of the 1820s a significant portion – say from 1/3 to 1/8 – of all primary schools in the Spanish American countries was already using this educational innovation. Between 1821 and 1826 the method was officialised by national or regional laws in Chile, Gran Colombia, Peru, Uruguay, and the *Provincias Unidas del Río de la Plata*; in Mexico and in the Central American republics this occurred during the first half of the 1830s.<sup>12</sup> Certainly not all these laws corresponded with the number and functioning of schools in reality, but the fact that laws were issued is in itself evidence of the importance that the method had acquired.<sup>13</sup>

<sup>11</sup> See E. Roldán Vera, The Monitorial System of Education and Civic Culture in Early Independent Mexico, in: Paedagogica Historica 35 (1999), pp. 297-331; E. Roldán Vera, Order in the Classroom: The Spanish American Appropriation of the Monitorial System of Education, in: Paedagogica Historica (forthcoming 2005).

<sup>12</sup> For a list of the laws and decrees that officialised monitorial schooling in the region, see E. Roldán Vera, Internacionalización pedagógica y comunicación (see note 7).

<sup>13</sup> See, among many others, D. Amunátegui, El sistema de Lancaster en Chile, Santiago 1895; M. Báez Osorio, La escuela lancasteriana en Colombia, in: Revista de Ciencias de la Educación 155 (1993), pp. 381-397; M. Caruso/E. Roldán Vera, Pluralising Meanings. Latin America and the International Movement for Mutual Education in the early nineteenth Century, in: Paedagogica Historica (forthcoming 2005); R. Fernández Heres, Sumario Sobre La Escuela Caraqueña De Joseph Lancaster (1824-1827), Caracas 1984; C. López/M. Narodowsky, El mejor de los métodos posibles (see note 8). H. H. Samayoa, Apuntes para la historia del método lancasterinno en Guatemala, in: Antropología e historia de Guatemala 2 (1953), pp. 32-62; J. Sosa, La Escuela lancasteriana: ensayo histórico-pedagógico de la escuela uruguaya durante la dominación luso-brasileña (1817-1825), Montevideo 1954; D. Tanck, Las escuelas lancasterianas en la ciudad de México, in: Historia Mexicana 32 (1973), no. 4, pp. 494-513; E. Vaughan, Joseph Lancaster en Caracas (1824-1827) v sus relaciones con el Libertador Simón Bolívar, con datos sobre las escuelas lancasterianas en Hispanoamérica en el siglo XIX, Caracas 1987; M. I. Vega Muytoy, La instrucción primaria en el estado de México, 1836-1845, in: M. del C. Sánchez (Hrsg.), Vistillas para un hacer, Toluca 1999, pp. 78-87.



Figure 1: New monitorial schools created by year and their cumulative number

Although not comprehensive, figure 1 demonstrates the dynamic of expansion of monitorial schooling (the creation of new monitorial schools or the conversion of traditional schools into monitorial ones) across the whole of Spanish America.<sup>14</sup> The graph, based on aggregated data for all the countries in the region, displays the characteristics of an 'S-Shape' curve, typical of the theory of diffusion of innovations. This represents the diffusion of an innovation as if it was an epidemic, proceeding through the phases of innovation, take-off point, 'explosion', stabilisation, and burn out. Described according to the role the various actors play in the diffusion process, these phases can also be characterised as those of innovators, early adopters, first majority, second majority, and laggards (figure 2).<sup>15</sup> We see how, after a period of slow, grad-

- Supplement 2: Detailed interactive sociogram of the overall network
- Supplement 3: Attributes of early adopters
- Supplement 4: Ordered centrality measures of the overall network
- Supplement 5: Sociogram of the 'London clique'
- 15 On diffusion of innovations and S-Shape curves, see E. M. Rogers, Diffusion of Innovations, 5th ed., New York 2003. For a description of the different phases of the curve in a totally different context, see D. J. Watts, Six Degrees: The Science of a Connected Age, New York 2003, chapter 6.

<sup>14</sup> The empirical data upon which this figure is based can be found in supplement 1. This, together with other statistical and graphical information related to this article, can be accessed through the internet site of the Comparative Education Centre: http://www2.hu-berlin.de/vgl\_ewi/networks. The following supplements are to be found there:

Supplement 1: New monitorial schools in Spanish America (absolute numbers)

ual 'adoption' of the method, its expansion reaches its 'take-off point' around 1822–23, a date after which it suddenly begins to expand exponentially until it reaches a stabilisation phase, around 1832. In the graph we see a second, less dramatic take-off point around 1843, which refers almost only to data coming from Mexico and Central America, regions in which, for different reasons, the method experienced a 'revival' around this period.<sup>16</sup>

Figure 2: 'S-shape' graph



Traditional, nation-based explanations of this phenomenon tend to account for the popularity of the method in terms of its economic appeal - as a method that allowed for the teaching of large numbers of pupils with few masters —; in terms of the *needs* of the countries to have an educated citizenry that was the basis of legitimacy of a new kind of independent and representative government; in terms of the perception of the need for a homogeneous educational system that gave unity to the recently-created states; in terms of the *political values* associated with the method - its pedagogic devices were seen as suitable for shaping a participatory, competitive, self-disciplined, lawabiding, republican individual -; or in terms of the role of one very active individual agent of the British and Foreign School Society (one of the European societies devoted to the international dissemination of the monitorial system), James Thomson. In addition, Jürgen Schriewer's externalisation theory has been used to show how the method was particularly appealing in Spanish America during a period of political transition, in which mere references to domestic institutions and traditions (associated with the Spanish

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<sup>16</sup> On the wave of expansion of the monitorial method in Mexico after 1842, see M. I. Vega Muytoy, La Compañía Lancasteriana en su gestión como Dirocción General de Instrucción Primaria, 1842–1845 (Tesis de maestria en historia moderna y contemporánea), Mexico 1995. On Central America, see H. H. Samayoa, Apuntes para la historia del método lancasteriano (see note 14), and C. González Orellana, Historia de la educación en Guatemala, Mexico 1960.

monarchy from which the independent countries were trying to break away) were considered inappropriate for the organisation of education, and thus external models (associated with the liberal values with which the independence process was loaded) were sought after.<sup>17</sup>

All these explanations serve to illuminate the process of disseminating the monitorial method from different angles, yet they still leave much unaccounted for. To what extent was the method 'introduced' by external actors or 'brought in' by internal actors from outside countries? What is the relative importance - in terms of the diffusion of the method - of the different individuals and organisations involved in the introduction of the monitorial system? How did communication across continents end countries take place? Why was the method introduced throughout the continent with such simultaneous timing? And, given these similarities, why did the method survive for more than 60 years in some countries while in others it became extinct after one decade of meteoric rise? These are the questions which, in our view, can only be satisfactorily answered with the contribution of a relational approach, i, e. an approach detached from explanations based only on historical appeals, general needs, or the extraordinary role of some individuals, and concentrated on the ways in which those factors are articulated in the interplay of the different actors involved in a complex network.

## 3. The Network of 'Early Adoptors'

This article examines the first moment of introduction end early implementation of the monitorial method in Spanish America. Years of research have enabled us to conclude that there were a number of personal relations between the 'early adopters' who first introduced the monitorial method throughout the continent; our aim here is to bring those relations to the fore and explore their analytical potantial. We will examine the network of those relations only during the first stage of the monitorial method's introduction and implementation and the beginning of the explosive phase – that is, the first sections of the S-Shape graph, roughly between 1818 and 1828. This is a period during which the monitorial system was fostered by a combination of both individual and institutional initiatives, some of which led to a more lasting cousolidation of it whilst others did not. Our purpose is to assess the ways in which the characteristics of this network affected the communication and implementation of the method, and to examine the role - in terms of connectivity and position - of the different individuals and associations involved in it.

The term 'early adopters' is usually applied to those individuals who, although they did not design the innovation themselves, found it appealing and

<sup>17</sup> E. Roldán Vera, Internacionalización pedagógica y comunicación (see note 7).

embraced it whole-heartedly at an early moment of its existence, and some of whom played a decisive role in its publicising and dissemination. In the case of the monitorial method in Spanish America, we have identified the following individuals as 'early adopters':

- (1) Those who founded a monitorial school, or started teaching in accordance with the monitorial method in an existing school, or founded a society to promote the monitorial method in a place where it was considered a novelty, with no connection to any pre-existing establishment in the area nor as a consequence of any law;
- (2)those who played an active role in disseminating the principles of the method by writing newspaper articles, or translating manuals, or by advising key members of the government on that implementation, in other words, 'opinion leaders' in the language of diffusion of innovations;
- (3) high-ranking government officials directly responsible for the formulation and execution of laws introducing, officialising or facilitating the implementation of the monitorial system of education in its first stages (congressmen, cabinet ministers, governors, vice-presidents or presidents of their countries).

The network of communication among the early adopters is represented graphically as a series of nodes or 'actors' (75 in total) linked to one another by a number of lines (figure 3).<sup>18</sup> The nodes are represented by different symbols: rectangles and diamonds are used to identify individuals (diamonds constitute a particular group of special characteristics which we discuss afterwards), whereas the rest of individuals are represented by small black squares. To allow for a better reading of the network, we have labelled only those actors whose role within the network we analyse in this paper. Municipalities are represented by triangles, and societies promoting the monitorial method by ellipses. The three European societies that were involved in promoting the monitorial method in Spanish America were: the British and Foreign School Society (BFSS), the French Société pour l'Instruction Eléméntaire (SIE), and the Spanish Real Sociedad Económica de Amigos del Pais (RSEAP-Cádiz). Both the societies and the municipalities are taken as individual nodes in so far as they behave like a united organisation; yet the agents sent by the societies to Spanish America are considered as individual nodes because they acted with a high degree of independence (financial, political, practical) with respect to their organisation.<sup>19</sup>

<sup>18</sup> The terms 'nodes' and 'lines' (or 'edges') derive from graph theory (whereby graphics are taken as synonym for networks), an important branch of mathematics which is highly relevant to network analysis.

<sup>19</sup> An interactive version of our network, including the names of all nodes, can be seen in supplement 2 (see note 14).





The lines between the different nodes represent channels of communication – 'ties' – through which the monitorial method was communicated, discussed, or recommended, and they can refer to personal contact, correspondence, shipment of material, or reading of specific printed works produced by other nodes (usually the societies). We are taking into account only recorded evidence of those contacts, evidence collected from secondary and primary sources ranging from private and official correspondence, personal memoirs, newspaper articles, and histories of the monitorial school movement in various countries (only in a few exceptions have we deduced the relationship from tangential sources). The fact that we consider only historically recorded links considerably reduces the overall number of nodes and connections in the network, yet this makes the exercise more faithful. Eventually it might be possible to make estimations of possible contacts based on other kinds of information.<sup>20</sup>

Regarding the dimension of time in which these relations took place, it should be borne in mind that this network is in a sense an artificial construct:

although all the lines do represent an actual connection, in reality not all those connections took place at the same time. We have registered all the recorded connections within a period of ten years (ca. 1818–1828) in order to include as many transnational links as possible (given the large geographic area under consideration, some allowance should be made for the time it took people, books and letters to travel), but it is true that a more accurate network should be restricted to a shorter period of time, or different networks should be drawn for successive periods. Yet we are aware that networks are dynamic entities, and that a consideration of the time of each node's entry in and exit from the network would provide other valuable information that might better help explain the eventual decay of the monitorial method in Spanish America.

#### 3.1. Mobility and functions of the actors

Before proceeding with the technical analysis of the network, it is important to revise some of the general attributes of the actors involved. Although individual attributes do not by themselves have an explanatory value in terms of network analysis, taken as a whole they enable us to make historical sense of the behaviour and structure of the network in general.<sup>21</sup>

The group of early adopters is characterised by two essential features: on the one hand, a high degree of geographical mobility, and, on the other, a variation in the roles played by many of the individuals in the network over a short period of time. Indeed, most of the early adopters travelled extensively, not only trans-continentally but also inter-continentally and within individual countries, in both Europe and Spanish America. Likewise, many early adopters performed different functions within the typology of early adopters: first as opinion leaders or school founders, and shortly after – or simultaneously – as high-ranking government officials. This geographic mobility and versatility of roles resulted in many nodes having a large number of connections and this inereased the cohesiveness of the entire network (more on this below). At the same time, that continuous displacement and those characteristics led to a reduction in the number of nodes required to disseminate the system across a vast geographic area.

<sup>20</sup> For example, considering individual membership in societies and organisations. On affiliation networks, see S. Wasserman/K. Faust, Social Network Analysis: Methods and Applications, Cambridge 1994, pp. 291 ff.

<sup>21</sup> See supplement 3 (see note 14) for details.



Figure 4: Mobility of actors from Spanish America to Europe and back

Geographic mobility occurred in several directions: among the first introducers of the method in Spanish America we find both 'foreigners' – British, French or Spaniards who travelled to Spanish America where they implemented the method – and 'locals' – Spanish Americans who travelled to Europe, learned the method there, and then put it into practice when they returned to their countries (or to a different Spanish American country). The trajectories of these mobile actors are graphically represented in figures 4 and 5. On the map shown in figure 4, we see the lines of the Spanish Americans who travelled to Europe and back, or travelled across Spanish American countries, while the map displayed by figure 5 shows the lines of the European early adopters who travelled to Spanish America and across Spanish American countries (and sometimes back to Europe).



Figure 5: Mobility of actors from Europe to Spanish America and back

Whether these travels were carried out with the specific purpose of learning or implementing the monitorial method is not relevant for an analysis of the network's composition and behaviour; at any rate, it is possible to say that, with a few notable exceptions, the majority of actors did *not* travel with such intentions in the first place but became involved in it after reaching their destination. Out of a total of 75 individuals involved in the early adoption of the method, 31% were foreigners and the rest were Spanish Americans, which suggests that direct foreign influence was not decisive for the embracing of the method. Yet out of the 52 Spanish American early adopters, 19 (25% of the total network) became acquainted with the method while they were in Europe: the rest learnt about it without leaving Spanish America, but at least 6 of them (8% of the total network) knew about the system when they were living in a Spanish American country other than their own. Therefore, the actors who found themselves in more than one country between Europe and Spanish America comprise 64% of the network (31 % Europeans in Spanish America + 25% Spanish Americans in Europe + 5% Spanish Americans in other Spanish American countries). While this dominant cosmopolitanism of the network is crucial to understand the general receptivity of the monitorial method (indeed cosmopolitanism is a typical characteristic of early adopters of all kinds of innovations), it also shows that nationality was not the most important factor in the introduction and spread of the system, but what mattered was the fact of having been in - or having strong contacts with - more than one country across the Atlantic or throughout the American continent. Moreover, in this case cosmopolitanism is a feature which, as we will see below, increases the betweenness value of the network, that is, the number of 'bridges' or 'connectors' between its distant or poorly-connected parts.

Furthermore, if we look specifically at the group of first teachers of the monitorial method, nationality does not seem to have played a significant role in the overall dissemination of the method either.<sup>22</sup> Among the individuals who are known to have taught in monitorial schools thuring the early implementation of the method in a given place, we find 16 foreigners (6 British, 5 French, 4 Spaniards, and 1 Italian) and 12 Spanish Americans. Of the foreign teachers, 3 were *sent* by a missionary organisation, the British and Foreign School Society (BFSS), with the purpose of teaching the monitorial system: James Thomson, Henry Durn and Anthony Eaton. They all acted with some degree of independence from the BFSS and therefore they are considered as separate nodes. Only five foreign teachers were hired or sought after, and all the others arrived independently – including Joseph Laticaster himself who arrived in Caracas in 1824 – or with a different purpose, and only when they were there were they offered the job or did they offer themselves for the job. It is possible to say that there was a certain level of opportunism in the way

<sup>22</sup> We take the category of 'first' teachers with some flexibility: not only is it sometimes impossible to determine who the very first one was, but also are often the 'second' and 'third' and 'fourth' considered as innovators in a given place as well and they may or may not be related to one another. Therefore, within this group we list all individuals whose work was consigned in the contemporary sources or in some of the secondary literature as 'innovative' in a particular place (and who were not formed in an already existing monitorial school of that same place). In defining these groups, we employ a good deal of judgement, which requires a good knowledge of the sources but also means that we are bound to problems of interpretation. The results can be found in supplement 3 (see note 14).

some people, especially the foreigners, became monitorial teachers.<sup>23</sup> As for the Spanish American teachers, the majority of them (58%) had lived in a country other than their own (either in Europe or in Spanish America), and some of the others had links with someone living abroad. These figures indeed suggest that cosmopolitanism rather than foreignness was the dominant attribute of the individuals who formed the network of early adopters.

## 3.2. Network measurements

What follows is a technical explanation of the meaning of each of the network measurements on which our analysis is based.<sup>24</sup> Most concepts refer to a measurement for the whole network and to a measurement for each individual node, and we calculate them both for the global network and for the network of each individual country. Two basic mathematical terms, 'path' and 'geodesic', are needed to understand the different measurements. A chain of connected nodes between the corresponding start- and endpoints is called a *path*. The first node can reach the last one over as many 'handshakes' (or 'steps') as nodes lying on that path. On the other hand, a *geodesic* indicates the shortest path or, if more than one exists, any of the shortest paths between two nodes. This term is essential for all centrality measurements: the geodesic of two directly connected actors consists of the tie between both, and the geodesic distance – or simply the distance – amonnts to one.

(1) Density of the network: percentage of present ties, that is, the proportion of all potential ties between the nodes that actually exist. It is calculated by dividing the total number of existing ties by the total number of theoretically possible ties. This measurement tends to be inversely proportional to that of the size of the network: the larger the network, the more direct connections for every particular actor are needed to sustain the density. Thus several networks cannot be compared directly in terms of their density, which is only possible when the number of nodes is the same.

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<sup>23</sup> The case of Joseph Lancaster's move to Caracas is particularly revealing of how the hiring of foreign tenchers was not necessarily a purposeful act to solve a perceived need. At the suggestion of an English colonel who had worked in Venezuela, Joseph Lancaster offered his services to the government of Gran Colombia, and only on reception of its letter did the municipality of Caracas think of hiring him in order not to lose the extraordinary opportunity of having the physical presence of the founder of a method which was *already* in use in other parts of the country. See E. Vaughan, Joseph Lancaster en Caracas (see note 13).

<sup>24</sup> This explanation, which would be considered irrelevant in journals largely devoted to social network analysis, is included here only attending to the lack of familiarity of scholars in the humanities with this methodology.

- (2) Average distance: sum of the geodesic distances between all nodes divided by the total number of possible connections. The distance of nodes which are not connected by a path cannot be calculated, and therefore the average distance of disconnected networks also cannot be calculated. As for the other geodesic-based measurements, the average distance of separated networks can only be calculated for the particular components and not for the network as a whole.
- (3) Diameter: longest geodesic distance between any pair of nodes. As for small average distances, small diameters often indicate 'small-world' networks, where each actor can reach every other actor over fewer handshakes than the total number of actors would suggest.
- (4) Centrality of nodes:<sup>25</sup> measurement of the connectivity and/or the position of an actor in relation to all other actors that is, the possibility of a node ('actor') being reached by the most nodes. By definition, the central node of the star graph (one node is connected to all others but these are disconnected from each other) has the highest possible centrality. Using this definition, the centrality values can be standardised by dividing them by the theoretically highest centrality value of the star graph centre for the given amount of nodes. Although this produces a scale between zero and one, the values can *not* be interpreted in terms of percentage.

(a) *Degree:* the number of direct connections from a node, therefore dependent only on the node itself and not on the structure of the network. We have chosen not to standardise the degree due to the more intuitive interpretation of the absolute number of connections in comparison to the standardised fraction values. In a descriptive sense, this term refers to the communicational activity of an actor.

(b) *Closeness:* this measurement is based on the principle that centrality is inversely related to distance. This can be translated into an algorithm consisting of the reciprocal value of the cumulated sum of geodesic distances between the particular viewed node and all other nodes. Thus, closeness describes how easily information may reach other nodes depending on the path distances between the origin and the recipients.

(c) *Benveenness*: the relative importance of actors in connecting different sections of the network – that is, the probability that commonication flows through each actor. In terms of structural attributes, actors with a high betweenness value act as 'brokers' (or mediators, facilitators) in the network. It is calculated by taking all possible combinations of two nodes, finding the geodesics between these pairs, and increasing the betweenness centrality of a node if it lies on a path between the pairs.

<sup>25</sup> The centrality of nodes and networks is described in L. C. Freeman (1979), Centrality in Social Networks: Conceptual Clarification. Social Networks, 1, pp. 215-239.

- (5) Centralisation of networks: for every node centrality (degree, closeness and betweenness) there is a corresponding centralisation index. It measures the relation of the actor with the highest centrality value to all others. Taking the particular centrality values, the centralisation of the network is the sum of the differences between the largest value and all other values equally standardised by dividing the resulting sum by the highest possible value. So this is not the average of all node centralities but a new measurement indicating the level of network centralisation, and therefore it cannot be compared with the actor centrality values.
- (6) Clustering coefficient:<sup>26</sup> in contrast to the density, which simply describes the relative amount of connections in the network, the clustering coefficient highlights the local density of connections. If nodes are arranged in strongly interconnected clusters where the node neighbours are linked to one another, the clustering coefficient has a higher value than in loosely connected networks, scattered in fragmented parts. This degree of connectivity can be formalised by identifying the 'triangles' in the network, that is, situations in which three nodes are all connected to each other. The term transitivity is also frequently used to explain clusters in the network structure, since it is the mathematical term for relations hetween three elements: if there is a link between the first and the second node and a link between the first and the third node.

Although we do analyse the individual network of each country, it is the analysis of the whole network which, in our view, renders the most useful results. Furthermore, given the relative scarcity of historical evidence for some countries, the analysis fares better in this case in a global than in a particular perspective. At any rate, it is important to mention that in the analysis of each country's network we include actors which were not necessarily physically present in the country itself nor were influential in only one country.

<sup>26</sup> D. J. Watts and S. H. Strogatz, Collective Dynamics of Small-World Networks, in: Nature, 393 (1998), pp. 440ff. See also A. L. Barabási, Linked: How Everything Is Connected to Everything Else and What It Means for Business, Science, and Everyday Life, New York 2003, pp. 46f. For a simple explanation how the cluster coefficient is ealculated, see S. Wasserman/K. Faust, Social Network Analysis (see note 20)

### 4. Connecting the nodes

What kind of network did these nodes constitute? Why did it allow for a successful and rapid introduction of the monitorial method in the first place, but afterwards the method developed at such different paces in the various countries? Which agents were more influential than others in soreading the method? At the beginning of this study, we had a number of assumptions concerning the introduction of the monitorial method in Spanish America, based on the sheer amount of information we had gathered. We had assumed, for example, that Great Britain had played the most prominent role in the introduction and dissemination of the method in the region, given that the method originated in Britain in the first place, that a high number of Spanish Americans learned about the method in London, that the majority of foreign monitorial teachers came from England, and that the British societies promoting the monitorial method were the most active on the continent. Yet previous research had already suggested that the impact of entities such as the highly-connected British and Foreign School Society was not as decisive as it seemed - or at least not as visible as one should expect - in the introduction of the monitorial method on the continent. Indeed, network analysis reinforced the idea that quantity of links is not always the best means of measuring the real influence of a node - be it an individual, an organisation, or a country - and that it is instead the structure of the network and the position of each individual actor within it which is decisive for the spread of an innovation. Let us discuss why.

First, to solve the puzzle about the simultaneity of the introduction of the method all over the Spanish American region and the coincidence of its climax in most of the countries, we asked ourselves: in what sense did the structure of the network of early adopters affect the communication of the monitorial method? Two elements were essential in answering this: an analysis of how fluid communication throughout the network could be, and a study of how well the network would succeed in holding together if some nodes ceased to exist. The common measurement of 'robustness', which determines how far a network can hold together under 'random attack' (the hypothetical case of one or more random nodes failing) did not seem very useful to us in analysing a historical network, for it was conceived as a criterion for constructing artificial networks (telephone or computer networks). However, we did perform some 'targeted attacks' (hypothetical removal of specific nodes) on the most highly connected nodes to assess their relative importance, and to make evident other alternative communication paths within the overall network.<sup>27</sup>

<sup>27</sup> A similar kind of analysis is described in S. Wasserman/K. Faust, Social Network Analysis (see note 20), p. 218.

To determine the fluidity of knowledge we first looked at how dense the network was. The density of the global network fuelling the diffusion of the method turned out to be 6.13 which means that only 6.13% of all possible ties between all the nodes actually existed. This value suggests that the overall network was not as highly interconnected as we had thought in the first place and as a first glance at figure 1 may suggest.<sup>28</sup> How to explain that fluidity, then? In fact, density is an inadequate measurement when assessing the flow of communication within the network; it is less the existence of a highly connected landscape than that of a few highly connected nodes within it which facilitates communication through them. This is due to the fact that highly-connected nodes – or 'hubs' – both reduce the distance between any pair of nodes and serve to centralise the diffusion of information.

A first look at figure 3 reveals that there are indeed a few nodes with an exceptionality high number of direct connections. There is one node which has a much higher than average degree value: James Thomson. There is a disproportionate relation between this one node with 26 direct connections and the 18 nodes who have only one link each, as well as an exponential transition between hoth extremes of the graph.<sup>29</sup> This disproportion and exponential difference, which is a property of all natural (and also many artificial) networks, is also represented in figure 6.30 One mathematical model for generating this kind of scale-free network is the one proposed by Barabási and Albert. Beginning with the seed of some initial nodes, the network grows gradually by adding new nodes; in every step a new node will be connected to the existing ones depending on the number of their existing connections. The more connections a node has, the more likely a new node will be able to connect it. Bambási and Albert called this the principle of 'preferential attachment'.<sup>31</sup> Although the curve in figure 6 does not fit the expected powerlaw distribution exactly, the tendency is clear and sufficient considering the relative paucity of available historical data. This type of network features small geodesics (the average distance of the overall network is 3.17 with a

<sup>28</sup> Although we can confidently say that if we go deeper in the empirical research, we will gradually find more links between the existing nodes (rather than more little-connected nodes), which would naturally increase the density of the network.

<sup>29</sup> The first column in supplement 4 (see note 14) provides 'degree' measurements for each node, that is, the number of direct connections each actor has within the network.

<sup>30</sup> On the omnipresence of power-law distributions in all kinds of networks, see A. L. Barabási, Linked (see note 24).

<sup>31</sup> One could argue that the probability of getting a node connected depends not only on the degree but also on the 'fitness' of this node to attract new nodes. About the fitness and the preferential attachment of nodes see A. L. Barabási, Linked (see note 26), pp. 95-96.

diameter of 6) and many paths between the nodes, and is thus open for fluid communication.

25 20 Number of nodes 15 10

Figure 6: Scale-free degree distribution of the early adopters (The continuous line represents a perfect power-law curve)

> > 10

5

5

0

0

The network topology of the early adopters, in which a few highly-connected nodes link a high number of nodes with relatively few connections, indicates, then, that the network of early adopters of the monitorial method was indeed relatively fluid. But who were the actors who played the most central role?<sup>32</sup> First and foremost is James Thomson, who built an impressive network of personal relations over a period of seven years (1818-1825) in five different countries: Río de la Plata, Uruguay, Chile, Peru, and Gran Colombia. In all of those countries, Thomson was invited and paid by the national governments. In Buenos Aires he was given the high post of Director of Public Instruction, and he occupied similar influential positions in Chile and Peru. Why and how one individual was able to build such a large network is still puzzling and should be the object of a separate study. For the purposes of this analysis it suffices to say that, within the context of the liberal enthusiasm of the 1820s, with the ideal of mass education and the general fascination with a method that offered to instruct large masses of pupils at low cost and in a short period of time, James Thomson was successful in introducing the monitorial system because he happened to be the right person in the right place at the right moment.<sup>33</sup> 'Preferential attachment' is a concept that may also help to explain

15

Degree

20

25

30



<sup>32</sup> The relative importance of each node is clearly indicated in supplement 4 (see note 14).

<sup>33</sup> See W. E. Browning, Joseph Lancaster, James Thomson, and the Lancasterian System of Mutual Instruction, with Special Reference to Hispanic America, in Hispanic

why Thomson was such an attractive node: it is a rule of scale-free networks that well-connected nodes tend to attract more nodes, and thus their centrality increases more rapidly than that of an average node. Thomson was indeed 'fit' (had the intrinsic qualities that made him look attractive for the job), and his growing reputation – reported in the press or in letters from diplomats to the governments of their own countries - led him to be songht after by various governments and people in positions of influence for the implementation of the monitorial method. The more links he had, the more inclined he was to make new connections. Moreover, the notion of preferential attachment is also related to the time of entry of a node into the network - the earlier a node enters the network, the larger the number of connections it develops - and Thomson was indeed one of the earliest adopters of the monitorial method in Spanish America - only after Solano García started teaching in Uruguay (1816) and José Rafael Revenga in Colombia (1819).<sup>34</sup> It goes without saying that Thomson's vast network of personal links did not necessarily guarantee the consolidation of the method once he was gone from a place, consolidation which depended on other factors (some of them of a relational nature as well) and was very varied in the different countries.

The second place in terms of degree of connectivity is occupied by the BFSS, with 15 direct links. This society was extremely active in Spanish America between 1818 and 1829, maintaining correspondence with influential individuals and Lancasterian societies, shipping classroom materials, and sending or certifying teachers (hired by Spanish American diplomats) on request. Yet, as we will see, this high-degree position does not correspond, in comparison to the other nodes, to an equally high centrality value, which suggests that a high number of direct connections does not necessarily equate to a high efficiency in the dissemination of the method.

After the BFSS, and excluding the *Real Sociedad Económica de Amigos del País*-Cádiz, the Moras couple, and Codorniú), we identify a series of 10 individuals with significantly high betweenness values, and whose number of direct connections ranges from 7 to 13.<sup>35</sup> These individuals, represented by diamonds and located in a central position in the visualisation of the density

American Historical Review 4 (1921), pp. 49-98; A. Téllez, James Thompson [sic], un viajero británico en México, in: Secuencia: revista de historia y ciencias sociales 27 (1993), pp. 71-84; E. Roldán Vera, Export as Import: James Thomson's Civilising Mission in South America (1818–1825) (see note 7).

<sup>34</sup> On nodes' 'fitness' and preferential attachment, see A. L. Barabási, Linked (see note 24), pp. 95 f. We are planning to make, eventually, a correlation between the time of entry of each node into the network and their actual degree. On Solano García, see J. Sosa, La escuela lancasteriana (see note 13); on Revenga, see R. Fernández Heres, Sumario sobre la escuela caraqueña de Joseph Lancaster (see note 13).

<sup>35</sup> The table with ordered centrality values (degree, closeness and betweenness) can be found in supplement 4 (see note 14).

of the network (figure 3), constitute a peculiar group within the overall network in terms of the pattern of their behaviour. Not only do they have a similar number of direct connections, but they are also strongly interconnected between themselves. In social network analysis terminology, highlyconnected subgroups are referred to as 'cliques', and this group indeed con-stitutes a structural clique within this network.<sup>36</sup> What the members of this group have in common is that they all lived in London as diplomats, independence fighters (collecting money and organising military expeditions) or political exiles for some time during the late 1810s or early 1820s, and afterwards returned to their own (or to a different) Spanish American country to occupy influential government positions. The group, which we have denominated the 'London clique', comprises prominent (and well-researched) personalities in the independence struggle and the establishment of the postindependent political order in Spanish America:<sup>37</sup> Lueas Alamán (Mexico), Andrés Bello (Venezuela/Chile), Simón Bolívar (Venezuela/Colombia/Ecuador/Peru/Bolivia), Antonio José de Irisarri (Central America/Río de la Plata/Chile), Ignacio Núñez (Río de ta Plata), José R. Revenga (Venezuela/ Columbia), Bernardino Rivadavia (Río de la Plata), Vicente Roeafnerte (Ecuador/Mexico), Marcial Zebadúa (Central America), and José de San Martín (Rio de la Plata/Chile/Peru). Most of them were acquainted with the method while they were in England, and either wrote favourable articles about it for their fellow countrymen or recommended the method to their governments. and, with a few exceptions, contributed to its implementation when they were back in Spanish America.<sup>38</sup> For these individuals, educational reform was one of the crucial elements in the re-organisation of the countries in which they were involved, and that partly explains their commitment to the dissemination and implementation of the monitorial method. It is also possible to argue that the reasons why they all and so eagerly embraced the method while they were in England were not only political and cultural, but also had a relational component – their internal proximity as a group. The period of their residence in London brought the group very close together, as all their members shared

<sup>36</sup> A graphical representation of this 'clique' can be found in supplement 5 (see note 14).

<sup>37</sup> In brackets appears first the country where they were born and second the country or countries in which they were active participants of the political life in the earlyindependent period.

<sup>38</sup> The exception was the Venezuelan Andrés Bello, who settled in Chile after 1829, when the enthusiasm for the monitorial method had already dwindled in that country. It is fair to say that, from the start, he had been slightly more reserved about the potential of the monitorial method than his contemporaries (he thought it suitable only for elementary schools because of its mechanistic methods), but still had helped his brother Carlos to run a monitorial school in Caracas in 1823, by sending him materials and manuals from London (see also note 49).

a common language, values, and religion, they lived in the same neighbourhood and frequented the same social circles.<sup>39</sup> Moreover, being in a foreign environment, the group was exposed to a relatively low number of influences from their surrounding context, and that fact means that such influences were more likely to have a stronger effect on the group. That partly explains why Jerenny Bentham or Francisco de Miranda, individuads who connected the group to the liberal political ideas of the day including the monitorial method, were so influential for the 'London clique'. In addition, being a tightly connected cluster meant that the threshold of adoption (that is, the level of personal resistance) with respect to an innovation coming from the few external influences would tend to be significantly low, since individual thresholds are directly related to neighbours' decisions.<sup>40</sup> The confirmation of norms and opinions as a result of the cohesion of the group was based therefore not on the individual characteristics of their members, but on the relational structure of the group itself. It is because of those unifying characteristics that we consider the group not only as a tight cluster but also as a functional clique, and take it as a singular entity - the 'London clique' - in further analysis of centrality in the network.

Once we have identified which are the most highly-connected nodes, we have an indication of the actors who played a relatively more important role in the dissemination of information on the method. This is however insufficient to nssess the specific weight of each node within the network, and for that we need other specific values related to their *centrality*, i.e. their degree and betweenness.<sup>41</sup> In what follows we summarise the findings, differentiating between those referring to the role of the European Lancasterian societies and those concerning specific individuals, followed by some brief remarks on the structure of the network in each separate country.

<sup>39</sup> Although not all of them were in London at the same time nor met personally there, their London life was a common experience, and they shared the same lifestyle and external contacts (see K. Racine, Imagining Independence: London's Spanish American Community, 1790–1829. PhD dissertation, Tulane University 1996; V. Llorens Castillo, Liberales y románticos: una emigración española en Inglaterra (1823–1834), Madrid 1979). These commonalities allow us to treat them as a clique, even though a few links between some of the nodes are missing.

<sup>40</sup> On individual thresholds, see D. J. Watts, Six Degrees (see note 15), pp. 229-239. Following from that we could eventually make an analysis of 'structural balance', by which the communities of opinion can be generalised and reduced to single entities or nodes. That is, however, a further step in network analysis with which we shall not engage here. See S. Wasserman/K. Faust, Social Network Analysis (see note 20), chapter 6: 'Structural Balance and Transitivity'.

<sup>41</sup> See supplement 4 for details (see note 14).

## 4.1. European Societies promoting the Monitorial Method

The British and Foreign School Society appears without doubt as a highly central node. Yet although it occupies second position in terms of degree and closeness values with respect to all other nodes, its betweenness lies in third place and consists of a much lower value than the degree.<sup>42</sup> In contrast to its prominent position in the network with 15 direct connections and short distances to all other actors (its closeness value of 0.46 locates it almost at the same level as Thomson) the society has comparatively less significance in connecting separate parts of the network. In other words, although the BFSS was in contact with several early adopters in Spanish America, it did not play an important mediating or facilitating role as the only node through which information flowed, for the parts of the network it reached were also being reached by other nodes. The importance of this betweenness value became more evident when we performed the hypothetical exercise of 'removing' each of the other most gentral actors (Thomson, the Real Sociedad Económica de Amigos del País-Cádiz, and the whole of the 'London clique').43

Overall Network		w/o BFSS		w/o		w/o London	-	⁻w/o Thomsón		
				RSEAP-Ca	diz	Clique				
Thomson	,424	Thomson	,45	Thomson	,46	Thomson	,54	RSEAP-C	,24	
RSEAP-C	,190	RSEAP-C	,17	Alamán	,18	RSEAP-C	,35	Bolívar	,21	
BFSS	,186	Codorniu	,16	Codomiu	,16	BFSS	,27	BFSS	,19	
Codorniu	,151	Bolívar	,15	BFSS	,15	Codorniu	,18	Codorniu	,18	
Bolívar	,119	Moras	,12	Bolívar	,13	Santander	,16	Moras	,16	
Moras	,108	Alamán	,12	Revenga	,12	Moras	,12	Irisarri	,12	
Rivadavia	,090	Revenga	,11	Moras	,11	SIE	,11	Santander	,12	
Santander	,088	Santander	,10	Rivadavia	,10	Esteves	,11	Rivadavia	,12	

Table 1: Comparison of betweenness values of the most central actors

Table 1 shows the betweenness values of the eight most central actors within the whole network together with their values when one of the other highly central actors is removed. Since these are not proportional measurements, the results should be compared only in terms of their tendencies. Here we see that without Thomson the betweenness is distributed more or less equally over all the other actors, but the BFSS' value is the one that experiences the smallest increase. Without the RSEAP-Cádiz the value of the BFSS becomes

<sup>42</sup> See supplement 4 for details (see note 14).

<sup>43</sup> Given this removal, the rest of the network was divided into separate parts. We were not able to calculate some measurements such as closeness for disconnected networks, so we decided to remove these isolated components as well, provided they were individual nodes. We have listed these isolated nodes in table 4.

even smaller.<sup>44</sup> Only in the network without the 'London clique' does the betweenness value of the BFSS increase significantly (from 0.186 to 0.27) - yet the escalation of the RSEAP-Cádiz (from 0.190 to 0.35) is in this case considerably higher. Regardless of which node we remove, in the resulting geodesics the BFSS is only rarely an intermediate station. These results reduce the *de facto* importance of the British society as mediator in the network of communication of the early adopters of the monitorial method, and suggest an explanation for its puzzling poor visibility in the records of the expansion of the method in Spanish America. (Of course one could argue that without BFSS there would have been no Thomson in the first place, but the fact is that Thomson followed a trajectory in the region that was quite independent in financial, administrative and logistic terms - from its link to the society, and this is why we treat him as a separate node). The facts that the diameter of the network increases only from 6 to 7 when the BFSS is removed, and that the average geodesic distance becomes only slightly higher as a result. serve to support this hypothesis: the BFSS made comparatively less of a contribution to shortening the geodesic and facilitating the flow of communication within the network.

The opposite trend is evident in the case of the Real Sociedad Económica de Amigos del País from Cádiz (RSEAP- Cádiz). This society was not explicitly founded to disseminate the moritorial method, like the BFSS, but it published one of the first Spanish manuals of the method and gave it some transatlantic publicity. Its geographic location meant that it was in touch with a number of Spanish American liberal deputies taking part in the Cortes of 1820.<sup>45</sup> With only eight direct connections, half of that of the BFSS, this society fares as high hi betweenness as the BFSS, and always occupies a higher place than the British society when any of the other hubs is removed. Without Thomson, the RSEAP-Cádiz indeed becomes the most central actor in terms of betweermess values, which confirms the efficiency of this society in conveying its message and influencing other parts of the network through a relatively small number of direct connections. This 'efficiency' of the RSEAP-Cádiz's network, in comparison to that of the British society, can perhaps be explained by the commonality of language and liberal political orientation of this society with those of a large proportion of early adopters in Spanish America. It was bound to be more influential for the few links of the Spanish society than the more numerous but culturally more distant links

<sup>44</sup> Whilst the betweenness value of Alamán becomes surprisingly prominent.

<sup>45</sup> On the Spanish societies who contributed to the promotion of the monitorial method, see R. Jiménez Gámez, La Sociedad Económica gaditana y la educación en el siglo XIX, Jerez de la Frontera 1991; V. Calderón España, Apuntes históricos sobre la escuela de enseñanza mutua de la Real Sociedad Económica sevillana de Amigos del País, in: Espacio y tiempo 5-6 (1991), pp. 171-174.

with the British one. Yet, since our analysis is based on the relational structure of the network, we cannot derive that the efficiency of the Spanish society in the dissemination of the method was due to an intentional or conscious tactic; we simply conclude that this was a result of the structure of its connections and its position within the overall network. In any case, the correspondence between cultural conditions and an effective mediating role in the communication of the monitorial method is remarkable.

A less efficient role was the one played by the French Société pour l'Instruction Elémentaire (SIE). Although this society has only one direct link less than the RSEAP-Cádiz, it fares significantly less well both in closeness and betweenness than the Spanish one. We have argued elsewhere that the SIE's contacts with Spanish America had much more of a self-legitimacy function for the French organisation than a real impact on the introduction of the method (which is not the case for Brazil, where the SIE played a more significant role than any other foreign society).<sup>46</sup> An analysis of its secondary position within the network reinforces this argument, since the SIE seems to have been unable to reach the relevant nodes that eventually could lead to a further dissemination of the method.

It can thus be said that, in spite of the rupture between Spain and its colonies, and in spite of the self-conscious efforts of many of the early adopters of the method to look for educational models from international references other than the metropolis, in reality Spain did play an important role in the introduction of the method in Spanish America. This was by virtue of the position of influential nodes such as the RSEAP-Cádiz in the overall network, as well as a few highly-central individuals of Spanish origin such as Manuel Codorniú and José Joaquín de Mora.<sup>47</sup> In what follows we examine the role of some of the individual actors within the network.

### 4.2. Individual actors

The scope of this paper does not allow us to look at each particular individual, yet it is worth mentioning two general characteristics of the network in this respect: on the one hand, the existence of actors whose degree value is considerably higher than their betweenness, such as Ignacio Núñez, José Cecilio del Valle, José Rafael Revenga, Andrés Bello, and Henry Dunn:

<sup>46</sup> E. Roldán Vera, Internacionalización pedagógica y comunicación (see note 7).

<sup>47</sup> Husband of Stephanie de Mora, also a founder and teacher of monitorial schools for girls. For the purposes of network analysis we have aggregated these two nodes into one (just as we aggregated the members of Lancasterian societies into one node), for they followed the same trajectory and had roughly the same connections.

Table 2:

Actors with considerably higher degree value than betweenness value

	Degree	Betweenness
Ignacio Núñez	7	.021
José Cecilio del Valle	6	.026
José Rafael Revenga	11	.070
Andrés Bello	10	.041
Henry Dunn	2	0

In the opposite case, with a relatively low degree value but comparatively higher betweenness, we find the cases of Manuel Codorniú, José Catalá, Camilo Henríquez, and Joseph Lancaster:

Table 3:

Actors with considerably higher betweenness value than degree value

	Degree	Betweenness
Manuel Codorniú	8	.151
José Catalá	4	.040
Camilo Henríquez	5	.055
Joseph Lancaster	5	.051

The main difference between these two groups is, once again, a disproportion between the number of links that each of them had and the actual possibility of passing that information on to other individuals.<sup>48</sup> Considerable disproportions are highly meaningful. In the cases of Núñez, Valle, Revenga, Dunn, and Andrés Bello the first quality is higher: Núñez, Bello, and Revenga were members of the 'London clique' and had important transnational connections; Revenga had also been in the United States, where he first learned the method.<sup>49</sup> Dunn was a teacher sent by the British and Foreign School Society

<sup>48</sup> We decided to continue with the analysis of the differences of degree versus betweenness and not of degree versus closeness nor closeness versus betweenness because of two reasons: first, in our opinion, betweenness is a better indicator for fluidity in the network than closeness or degree; second, the correlation coefficient between degree and betweenness (0.84) is higher than between degree and closeness (0.70) or between closeness and betweenness (0.60). Thus the finding of differences has a greater statistical significance.

<sup>49</sup> Núfiez was secretary of the diplomatic mission of the Argentine Rivadavia in London, and maintained correspondence with the BFSS both in Britain and when he was back in his country; Andrés Bello sent manuals and related materials about the method from London to his brother Carlos when the latter was appointed to run a

to Central America. Yet their relatively lower value of betweenness suggests that they were not the only ones who were reaching the sections of the network they were dealing with, or that their connections were not essential for the overall communication flow. In contrast, individuals such as Codorniú, Catalá, Henríquez and the very Joseph Lancaster seem to have played a more influential role within the network: Codorniú was an important link between Spain and Mexico in the introduction of the system, Catalá took the method from Buenos Aires to Uruguay, and Henríquez from Buenos Aires to Chile<sup>50</sup>, whereas Lancaster travelled from England to the USA to Gran Colombia where he opened a model monitorial school that gave much to talk about (in a good and in a bad sense) and from there his daughter and son-in-law left for Mexico.<sup>51</sup> They were bridges between countries just like the other group, but they seem to have conveyed the method to regions no other node reached.

- 50 Manuel Codorniú was a Catalonian functionary who arrived with the last Spanish governor of Mexico, Captain General Juan de O'Donojú, in 1821, and stayed in that country after the independence treaties were signed. He was a leading founder of the Lancasterian Company of Mexico City and wrote most of its statements, regulations, and manuals, in which he made reference to a number of Spanish and French sources about the monitorial method. José Catalá was another Catalonian resident in Buenos Aires at the time James Thomson arrived there. He learned the method from Thomson and then was sent by the latter to introduce it in Uruguay; although Thomson had been invited by the then Brazilian authorities of Uruguay to be in charge of primary education there, he sent Catalá on his behalf because he already had decided to take a similar post in Chile. Camilo Henriquez was a Chilean political exile in Buenos Aires between 1814 and 1822. From there he sent enthusiastic reports to his friends and to the Chilean authorities about the monitorial method which was at the time being introduced in the Provincias Unidas del Río de la Plata. On his return in to Chile he was a founding member of the Sociedad de Enseñanza Mutua (Society of Mutual Teaching) established by Thomson in 1822. See, among others. M. Codomiú y Ferreras, Discurso inaugural que en la abertura de las escuelas mutuas de la Filantropia, establecidas por la Compañía Lancasteriana de México en el que fue convento de extinguidos betlehemitas, dijo el ciudadano Manuel Codorniú y Ferreras, presidente actual v socio fundador de la misma, en el dia 16 de noviembre de 1823, tercero de la independencia y segundo de la hbertad, Mexico 1823; M. L. Amunátegui, Camilo Henríquez, Santiago 1899; J. Sosa, La Escuela lancasteriana (see note 13).
- 51 The experience of Joseph Lancaster in Caracas is richly documented in R. Fernández Heres, Sumario sobre la escuela caraqueña de Joseph Lancaster and E. Vaughan, Joseph Lancaster en Caraeas (see note 13).

monitorial school in Caracas, and he also wrote an assessment of the method for the Chilean envoy Irisarri, who forwarded it to his government. Revenga tried to put the method in practice in Angostura (Colombia) at his return from the United States in 1819; he was not successful in disseminating it at that time, but later his efforts or promoting the method from England seem to have been more effective, as he hired the French tencher Commettant to go to Colombia to conduct a normal monitorial school.

There is no essential difference in the attributes of the individuals of both groups: all of them were cosmopolitan liberals; they all believed strongly in the benefits of the method; and one could not even argue that they differed in their degree of awareness or 'consciousness' of the role they were playing in the dissemination of the method. The main difference lies simply in the position they occupied within the network.

Another method of social network analysis consists in identifying the socalled 'local bridges', that is, ties connecting separate parts of the network without which these parts would be divided into disconnected components. As for ties, it is also possible to romove individual actors from the network to gain a better understanding of how important those actors are in terms of connectivity and thus also in centrality.<sup>52</sup> Through this, social network analysis allows us to play with the different variables in order to assess their real importance *a posteriori*: what would happen if a certain node had not been there? This speculation is not an exercise of counterfactual historical enquiry, but simply a tool to assess the specific weight of an individual agent or organisation – understood as a relational node – in a given scenario. In our case, taking away one of the most highly connected nodes - Thomson, the BFSS, RSEAP-Cádiz, or the 10 members of the 'London clique' - does not make the global network of early adopters fall apart in its components, but only leads to the isolation of a small number of actors (table 4). The absence of local bridges clearly shows that the communication flow within the network was not dependent on one single hub. The network was centralised enough to guarantee short distance paths, but not too centralised to break apart if one or several nodes failed. This shows also a weakness in the bridges' definition because in highly connected networks there are hardly any bridges - the more connections there are, the greater the possibilities of reaching one node from another. Fortunately, there are more methods and measurements to describe the transition between centralised topologies with many bridges and decentralised ones without bridges.

#### 4.3. Individual countries

The question of why the monitorial method dwindled very fast in some countries while it prevailed much longer in others has until today not been properly dealt with in the national histories of this educational innovation. Al-

<sup>52</sup> The definition of local bridges is weaker than the definition of bridges. By contrast to bridges, by removing a local bridge the nodes on either side of it become reachable from each other only via very long paths, but the network still remains connected. See S. P. Borgatti, Centrality and AIDS, in: Connections: Official Journal of the International Network for Social Network Analysis 18 (1995), no. 1, pp. 112-115 for a description of the relation between centrality and bridges for any kind of network diffusion, and especially for sexual networks.

though an analysis of the network of early adopters cannot provide a comprehensive answer to it, there is one measurement that may offer some insights, the so-called 'clustering coefficient'. The principle of this measurement consists in classifying the links between the different actors into 'strong' and 'weak' 'ties' and identifying the different roles that each kind of tie plays within the network. 'Strong ties' (closor relationships such as those of family and friendship) facilitate cohesion and thus are a prerequisite for the continued existence of groups, whereas 'weak ties' (distant or occasional contacts such as acquaintances, business partners, etc.) connect those groups with one another. Not all 'weak lies' have to be local bridges, but all local bridges constitute 'weak ties'.<sup>53</sup> Regarding the diffusion of an innovation, 'weak ties' are decisive for its dissemination and 'strong ties' are more important in its implementation. Although Granovetter has formulated a theory concerning strong ties as implication (strong ties create transitivity) and not as equivalence (strong ties are by necessity transitive and vice versa), in our opinion the amount of transitive relations (i.e. the size of the clustering coefficient) also indicates that these relations are strong ties. The foundation of a soclety to promote the monitorial method is a good example of how common ideas of the members of a group generate cohesion but they are not necessarily a precondition for that cohesion - they can also be a result of the interactions within the group. It is obvious that the existence of common models or ideas cannot be explained solely by reference to a certain social structure, but in fact mutual goals and collective values or norms and transitive ties between the actors can influence one another. We can certainly say that an idea will have a shorter life if the individual who adopts it does not belong to a cluster of individuals with whom he can share it and possibly start some kind of action (e.g. founding a school), whereas the existence of clusters facilitates (without guaranteeing) a longer life for that idea. The clustering coefficient can thus help to explain the dynamic of diffusion of an innovation in the different countries, although it does not say anything about the reasons why the idea was introduced or successfully communicated in the first place.

As table 4 shows, the clustering coefficient in most of the individual countries studied is similar to the average clustering coefficient of the whole network (0.35). Yet there are three remarkable exceptions: on the one side Gran Colombia (0.03), and on the other side Chile (0.49) and Mexico (0.65). This clearly indicates that in Gran Colombia there was no aggregation of individuals into groups, whereas in both Chile and Mexico actors formed groups that were closely interconnected.

<sup>53</sup> M. Granovetter, The Strength of Weak Ties, in: P. V. Marsden/N. Lin, Social Structure and Network Analysis, Beverly Hills 1982.

Cluster Coeffi- cient	.35		,03	,35	,39		,35	,49	,65		,30		,37		,32	,31
Avg. Distance	3.17	,	2,71	2,41	2,13		2,03	1,99	1,97		3,24		3,29		3,49	3,34
Diameter	9		5	5	4		4	3	3		9		7		7	7
Between- ness	.40	Ì	,23	,62	,48		,29	,56	,50		,42		,43		,51	,21
Close- ness	30		,21	,53	,42		,41	,58	,46		,29		,30		,31	,25
Avg Degree	4.53		2,67	2,82	2,91		3,17	3,47	4,71		4,34		4,44		3,29	4,34
Density	6.13%		15,69%	13,42%	29,09%		28,79%	24,76%	36,26%		6,20%		6,16%		5,39%	6,89%
Isolated nodes				<u> </u>							ŝ		1		3	10
Number of edges	170		24	31	16		19	26	33		154		162		102	139
Number of nodes	75		18	22	11		12	15	14		71		73		62	64
	overall Network	By country:	Gran Columbia	Prov. Unidas	Peru	Central	America	Chile	Mexico	By removal:	w/o BFSS	w/o RSEAP-	Cádiz	w/o London-	Clique	w/o Thomson

# Table 4: Network measurements

Moreover, if we look at the centralisation measures at the national level, we see that the value of closeness is, with the exception of Gran Colombia, higher for the individual countries than for the whole of the network. Considering that the average distance is smaller for the country with the largest number of actors, this confirms that Gran Colombia had the most dacentralised network of early adopters. By contrast, Chile and Mexico had the most centralised networks: they have the smallest diameter of all and their average geodesic is equally the lowest.

Figure 7: Sociogram of the Chilean network of early adopters (The highlighted lines are meant to clarify the tree-like structure)



The decentralisation of the network of Gran Colombia is indeed surprising given that this was one of the countries in which the method became institutionalised and officialised by law rather early. Although part of this decentralisation may be explained by the sheer size and abrupt geography of the country at the time (a confederation of today's Venezuela, Colombia, Ecuador, and Panama), it is interesting to note that institutionalisation is not necessarily a result of a pre-existing centralisation (actually, in cases such as this one institutionalisation seems to have been an attempt to homogenise what already existed in heterogeneous form). On the other hand, Chile and Mexico are much more centralised but in very different ways: whereas Chile's network develops mostly in a tree-like topology around the figure of Thomson (who has a much higher than average value of closeness), the centre of the Mexican network is occupied by Codorniú as the connector of two groups (figures 7 and 8).<sup>54</sup>

As we said before, a centralised network with a small clustering coefficient may favour rapid communication, but it is highly vulnerable if the most central actor (or the actor with the highest betweenness value) ceases to exist. Following this logic, it should not be surprising to realise that the method disappeared faster in those countries in which it had established itself more rapidly thanks to a centralised network. This was the case for the countries in which Thomson was most active, Río de la Plata and Chile. Indeed the betweenness value of the network of early adopters in those countries, that is, the measure of the centralisation of the network depending on the most central actor, is much higher than in the rest (0.62 and 0.56 respectively).

We observe quite the opposite trend in Mexico, where the mediod had a longer life preoisely because Thomson *did not* play a role there: instead of the 'ego-centered network' that Thomson was so good at creating in Río de la Plata and Chile, the network in this country did not rely on one single individual and therefore was less vulnerable to failure if that node failed. Yet the persistence of the monitorial method cannot be explained only by the lack of centralisation of the network of early adopters, but also by the cohesion of the groups involved in the diffusion of it. With Codorniú as the intersection between the group of members of the Lancasterian Company and another section of inter-connected individuals, the betweenness centralisation is 0.5, third on the list of all the countries, but the clustering coefficient occupies first position with 0.65. Therefore, we can conclude that centralisation was not the decisive factor in the expansion of the method in this country, where this was taken over by at least two different groups.

<sup>54</sup> For a chronicle of the development of the monitorial method in Chile, see D. Amunátegui, El sistema de Lancaster en Chile (see note 13). On Gran Colombia, see M. Báez Osorio, La escuela lancasteriana en Colombia (see note 13); M. Caruso, New Schooling and the Invention of a Political Culture: Community, Rituals, and Meritocracy in Colombian Monitorial Schools (ca. 1820–1840), in M. Caruso/E. Roldán Vera (eds.), Promising Imports (see note 7). On Mexico see, for example, J. M. Lafragua/W. Reyes, Breve noticia de la erección, progresos y estado actual de la Compañía Lancasteriana de México, Mexico 1853.



Figure 8: Sociogram of the Mexican network of early adopters

This non-dependency on a central actor may also account, to an extent, for the slower pace in the dissemination and implementation of the method in this country (as well as in Central America, whose network of early adopters was also relatively decentralised), but it also meant that the network was less linked to the changing political scene. The formation of an articulated cluster from the very beginning of the introduction of the method reduced the dependency on one individual node and created the conditions which enabled actors to be changed within the cluster without affecting its general functioning.<sup>55</sup> An interesting case in which the monitorial method survived for a confined sector of society when it was no longer in use in the rest of it, is that of the Argentinian schools for girls ran by the *Sociedad de Beneficencia*, where the method prevailed for 60 years. This was an institution founded by Rivadavia (independent from Thomson) but which formed such a strong and independent cluster that it managed to survive once Rivadavia was no longer in power. This cluster maintained, like the Mexican Lancasterian Company, a

<sup>55</sup> For a study of the members of the board of the Compañía Lancasteriana of Mexico City over time, see W. Fowler, The Compañía Lancasteriana and the Élite in Independent Mexico, 1822-1845, in: Tesserae 2 (1996), pp. 81-110.

certain degree of independence from the changing governments, an independence that could certainly have been favoured by the specific commitment of the society to the lower-class female population.<sup>56</sup>

## 5. Conclusions

Throughout this article we have argued that the simultaneity, speed, and similarities in the first expansion of the monitorial method in early-independent Spanish America cannot be explained solely in terms of a confluence of historical processes, but they become much more intelligible when they are analysed in terms of the structure of the network of that expansion. Analysing the global network of the monitorial method's early adopters has demonstrated that the information flow took place through and around four central instances – James Thomson, the British and Foreign School Society, the Sociedad de Amigos del País from Cádiz, and the 'London clique' - vet the network was not exclusively dependent on one single node. This structure reduced the possibility of the communication channels breaking and allowed for the development of short, less vulnerable channels. We have also outlined the different roles that nodes play in this network according to the position they occupy within it, and we have argued that, in this transcontinental, geographically widespread and relatively small (in number of nodes) network, the nodes which were more decisive for the expansion of the method were those with a high degree of 'betweenness'. These nodes considerably reduced the distance (diameter and average distance) between all the actors of the network, and thus acted as effective 'bridges' to all sections of the network. We have also argued that the method had spread itself faster in eountries with a more centralised network of early adopters, yet the very characteristics that favoured that velocity were responsible for its rapid decay: when the central actor falled the network was not able to hold together for long, as occurred in both Río de la Plata and Chile when Thomson left. By contrast, networks with several transitive connections leading to the formation of clusters had a more cohesive structure that facilitated, as was the case in Mexico, the longer persistence of the method.

The short life of the monitorial method's appeal in countries like Chile and Argentina has usually been explained by changes in the political ideals after the 1820s, when a certain decay of doctrinal liberalism gave way to a relaxation of the republican institutions and a return of authoritarian forms of power and *caudillismo*. Thanks to the perspective employed in this article, it becomes evident that part of the explanation of the decline of the method in those countries has to do with the structure of the network of early adopters.

<sup>56</sup> On the Sociedad de Beneficencia, see Sociedad de Beneficencia de la capital: su origen y desenvolvimiento, 1823-1923, Buenos Aires 1923.

Bridges over the Atlantic

These networks were clearly intertwined with the dominant political sphere; Thomson received crucial support from the leaders Rivadavia and O'Higgins in each country, and once their parties were out of the political scene Thomson's work would be weakened. Yet it is neither a change of political ideals nor a realisation of the 'failure' of the system that alone led to its extinction, but the inability of Thomson to consolidate the institutions reproducing the method outside the sphere of partisan politics of his time. The argument can certainly be turned around by asserting that the very making of strong links that would have guaranteed the longer life of the method was *prevented* by the changing sphere of partisan politics and political discourses of the time. This, however, does not undermine the kind of network analysis we have carried out here, which is meant to enrich and give some social basis to explanations based on an abstract history of ideas. It is not the change in political ideals per se which leads to changes in educational structures, but the ways in which the people who support those ideals organise themselves and relate to one another.

By setting aside individual attributes such as intentionality, culture, nationality, class, gender or political orientation as ultimate explanatory units, social network analysis has proved to be a useful complementary approach to understanding the dissemination of an educational innovation. This essentially relational perspective is a useful means of grasping some of the global dimensions of historical and social processes, through a reconciliation of empirical research with a global picture that transcends regional and national boundaries. Indeed, the national unit of analysis seems rather inappropriate in studying these processes in which relations, cliques and clusters are formed regardless of national political boundaries, and this approach suggests that we should look for alternative study units. Social network analysis is an extremely valuable tool in comparative research, both to assess the relations between two or more separate entities, and to explore the differences in terms of internal relational processes articulated in diverse network structures. In a way, it allows us to see the complex conditions that structure and give shane to any communication process, but it is the task of other kinds of analysis to examine how those conditions actually affect the knowledge conveyed and how they frame the relations established between the individuals and institutions involved in the communication. Network analysis provide us a sense of flow, but we need further tools to conceptualise that flow, and to try to turn the communication process itself into our unit of analysis.