

# The Creation of Learning Networks in Two Spanish Public High Schools

## One-to-One Programs' Effectiveness

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**Abstract—** This paper tries to analyse learning networks in the context of non-compulsory secondary education in the Spanish public schools, within their process of moving towards more innovative models based on progressively greater use of active learning methodologies as well as on greater and better use of ICTs. Our goal was to determine, using the SCCI (Rovai 2002), the degree of consolidation of the learning networks formed by students in the first year of non-compulsory secondary education at two quite different public high schools: one large school in an urban area (Institut Joaquín Bau in Tortosa, Tarragona, Spain) and one small school in a rural setting (Institut Els Ports in Morella, Castellón, Spain), and all for determining how important the kind of school and school environment can be when creating learning networks.

**Keywords-** learning network, blended learning, SCCI, collaborative learning, high school, one-to-one

### I. INTRODUCTION

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In recent years, the study of formal learning networks has focused mainly on the university level, but the application of this analysis to lower levels of formal education can also yield important results. The methodological revolution brought about at the university level by the move towards establishing a European Higher Education Area (EHEA) has also begun to be seen in studies of the primary and secondary levels. In Spain, primary and secondary education have already moved towards participatory and much more interactive educational methods, signalling a major leap forward in a domain that until recently was practically dominated by traditional methodologies in which the natural flow of the teaching-learning process was one-way: from teacher to student (Handley et alii 2007).

Once confined to an oasis tended by a handful of teachers constituting a true vanguard, collaboration-based methods have now begun to receive not just institutional approval but also clear official backing. Governments have begun to provide

numerous forms of aid and support for these practices. Examples of this phenomenon include the highly popular Telematic Educational Network of Catalonia, commonly known by its Catalan initials, XTEC (<http://www.xtec.cat>) and the creation of specific administrative units, such as the Directorates-General for Educational Innovation of Catalonia and Valencia (the two autonomous communities where the present study was carried out). The most apparently novel practices are those having to do with changing the educational model and achieving the widespread use of new information and communication technologies as an essential tool in the teaching-learning process—a process in which students are now indisputably the protagonists (Cela & Gisbert 2008). These practices frequently involve teaching-learning activities based on the use of WebQuests, blogs, wikis and other resources that, in one way or another, are capable of taking considerable advantage of the educational potential of collective work. Previously novel concepts, such as peer-group learning and co-assessment, are, it seems, here to stay in our educational system—not only at the university level, but also in compulsory and post-compulsory pre-university education.

In this context, in which we grant such pre-eminence to learning methods based on peer relationships, it is essential that we reflect on the factors that are necessary for the creation of learning networks—that is, the conditions that are necessary in order for a group of individuals to cooperate collaboratively for the purpose of shared learning. Methodologies, of course, provide guidance in this regard, and it is crucial to determine to what extent different practices assist in the creation of these networks; however, methodologies are far from the only determining factor. As noted by Bonàs (2007), the creation of a learning network requires factors such as previous links, acceptance, recognition, esteem, discovery of the other, shared experiences, etc. Moreover, the improvement of education also necessarily involves questioning the aspects just mentioned and bringing together the voices, skills and efforts of all agents involved in education (Janussi 2005).

Learning networks, or collaborative learning groups, have attracted the sustained interest of numerous researchers in recent years. The earlier studies in this field focused mainly on

face-to-face teaching, whereas the numerous studies conducted over the last decade have shifted their focus towards asynchronous learning networks (ALNs) (see Rovai 2002). Studies of compulsory education or post-compulsory secondary education, like ours, need to return the focus to face-to-face teaching because practically all students in compulsory and non-compulsory secondary education in Spain attend face-to-face classes.

Few studies have analysed the specific conditioning factors that affect learning networks at these levels; as far as we know, not a single study—in Spain, at least—has examined the relationship between the creation of stable learning networks and academic performance (a highly interesting subject that is unfortunately too ambitious for an initial effort like this one). The few studies that have been published chiefly provide holistic descriptions of learning networks characterised by especially close bonds (Fálces & Palenzuela 2005, Odina 2004) and do not conduct a formal and exhaustive analysis that would allow us to isolate, understand and systemise the factors that go into the creation of learning networks. In this study, therefore, we initiate a process of reflection aimed at determining the degree to which the type of school influences the creation of learning networks. To do this, we will analyse two non-compulsory secondary education groups at very different schools: one large, urban school (Institut Joaquín Bau in Tortosa, Tarragona) and one small, rural school (Institut Els Ports in Morella, Castellón).

We know that learning outcomes improve when students work collaboratively (Meneses 2007) in the context of a learning network. The conditions for finding out how these learning groups develop in face-to-face and virtual environments have become increasingly propitious. Nevertheless, we still know very little about how factors such as pre-existing relationships among students, school size, etc., influence networks. If the school is the entity that has the greatest effect on the dynamics of a learning network (Fálces & Palenzuela 2004), what influence does the particular nature of that school have on the creation of stable work groups? Perhaps more importantly, what factors should we promote, and with whom should we form alliances, in contexts that happen to be less favourable to the creation of learning networks?

## II. LEARNING NETWORKS AND COLLABORATIVE WORK

It is never simple to define the concept of the learning network. In attempting to do so, we immediately encounter one important obstacle: the fact that the concept has gone by many different names. We also find ourselves obliged to consider just how polysemous the label learning network is. Thus, we know that, generally speaking, learning network, collaborative learning group and other similar terms are essentially synonymous; still, each of these terms may express different nuances, depending on the theoretical model in which it is used (Meirinhos & Osório 2009).

Therefore, we must begin by considering, in general terms, what we understand by the term learning network. To do this, we return to the question initially posed by Ripa (2007: 203): ‘Is [a learning network] a group of people who participate in a

course, or a group whose members have a particular kind of relationship with one another? Is it a condition, a process or a result? Is it an objective reality or a subjective interpretation?’ The problem, as Ripa acknowledged, is that ‘the expression is often used to talk about these things without specifying its scope or meaning’.

In response to this unresolved problem, scholars have offered numerous definitions aimed at bringing their object of study into focus. In recent years, the term learning network has usually been used to define, in the context of higher education, a group of students—and in most cases their teachers, as well—who share a single teaching-learning process based on educational activities and models guided by values such as collaboration, interaction, exchange and mutual ownership of work-related documents (Daele & Brassard 2003).

This same point was made by Johnson & Johnson (1999) in their definition of collaborative learning group, which highlighted cooperation and positive interdependence as the primary characteristics of interaction among the members of the group. Other scholars have described characteristics such as feeling of community, conditions of support and trust, collaboration, and interaction as inherent to learning networks (Tirado, Marín & Lojo 2008).

Notwithstanding the foregoing, the creation of a learning network is not a process characterised exclusively by two opposing positions. On the contrary, most authors agree that learning groups go through different stages of cohesion among their members. Thus, to use the model proposed by Johnson & Johnson (1999), we can speak of pseudogroups, traditional groups and true collaborative learning groups, with only the last of these three stages being considered a learning network in the strict sense.

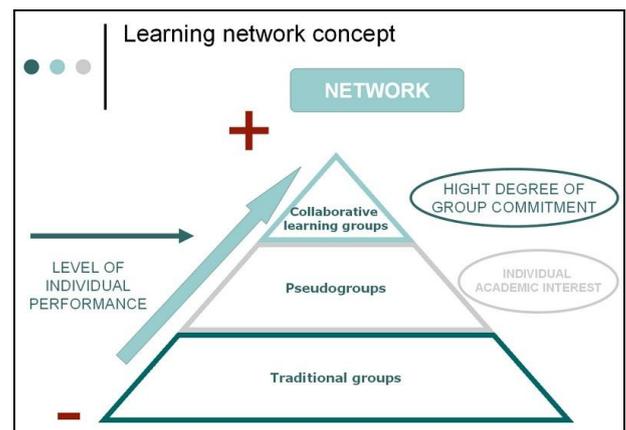


Figure 1. Work groups and learning networks

The first two kinds of aggregations do not go beyond the level of individual performance. In true collaborative learning groups, the students reach a high level of shared commitment that goes beyond the mere individual academic interest that characterises pseudogroups (in which the members work together, although they may not be interested in doing so) and traditional groups (in which the members’ expectations

regarding group work tend to be low, even if their interest is high).

Along the same lines, although with different terminology, Henri & Pudelko (2002) highlighted the different degrees of consolidation of learning networks (which they called communities of practice) according to two variables: 1) the strength of the relationships established between the group members, and 2) the intentionality and awareness of belonging to a group of a higher order, and with greater strength, than the individual. Their nomenclature draws a distinction between communities of interest, communities of intelligent interest, communities of learners and, finally, communities of practice. This scale works upwards from simple groupings of students with a shared interest in learning to true learning groups.

In any case, all of the scholars who have studied this topic agree that the most noteworthy factor, above and beyond any other measurable criterion, is the existence of a spirit or sense of community (Rovai 2002, Rovai & Jordan 2004), a clear awareness of belonging to a group whose success depends on personal satisfaction and whose interests, in most cases, must prevail over those of the individuals. This sense of community is generally described as an ‘exceptional degree of commitment of the members to one another and to the success of the group’ (Ripa 2007: 205).

This spirit or sense of belonging is so fundamental to the consolidation of a learning network that it is considered to be the determining factor in whether a particular work group can be said to exist. In studies on this topic, Rovai (2001, 2002) introduced the Sense of Classroom Community Index (SCCI), the instrument for measuring the sense of community belonging that is used in this paper, which is described in greater detail below.

Finally, there is no doubt as to the interrelationship between the creation of learning networks and methodologies based on collaborative work, defined as the exchange and development of knowledge by small groups of peers who share the same academic goals (García Sans 2008: 1). The benefits of collaborative work could be summarised as follows: it increases motivation, it improves academic performance by creating a feedback loop between individual and group learning, it improves retention of learned material, it boosts critical-thinking skills, and it increases the diversity of the knowledge acquired and experiences gained (Martín-Moreno 2004).

### III. OBJECTIVES

It is against the backdrop described above that we undertook this study of learning networks in the context of non-compulsory secondary education in the Spanish public schools, which are currently in the process of moving away from traditional models and towards more innovative models based on progressively greater use of active learning methodologies as well as on greater and better use of ICTs. Our goal was to determine, using the SCCI (Rovai 2002), the degree of consolidation of the learning networks formed by students in the first year of non-compulsory secondary

education at two quite different public high schools: one large school in an urban area (Institut Joaquín Bau in Tortosa, Tarragona, Spain) and one small school in a rural setting (Institut Els Ports in Morella, Castellón, Spain).

After determining the SCCI (see Section 2) of these respective networks, we were able to pursue two further objectives: 1) to determine the relationship between the type of school and the intensity with which learning networks are established; and 2) to consider some proposals for improvement derived from the aforementioned reflection in order to tangibly improve the SCCI and, ultimately, the learning process of the different networks.

### IV. METHODOLOGY AND CONTEXT OF THE STUDY

The primary tool used in this study was the second version of the Sense of Classroom Community Index (SCCI) (Rovai 2002).

This instrument consisted of a self-administered questionnaire aimed at measuring the sense or spirit of community belonging. The questionnaire had 40 questions, 10 of which were designed to investigate subcomponents of spirit (i.e. ‘I feel connected to my colleagues’), trust (i.e. ‘I trust my colleagues’), interaction (i.e. ‘I feel motivated to ask questions’) and learning (i.e. ‘I feel that we all contribute to the learning process’). For each question, participants were asked to choose from among five options on an agreement/disagreement scale (strongly agree, agree, neutral, disagree, strongly disagree).

This scale allowed us to generate a series of indicators based on the model developed by Rovai (2002), which includes the general SCCI (which has a maximum score of 160 points) and sub-indices such as spirit, trust, interaction and learning (each of which has a maximum score of 40 points).

As detailed in Rovai (2001), the validity and trustworthiness of the questionnaire has been widely demonstrated, in particular because it: a) incorporates the most commonly accepted concept of learning network; b) reflects the learning-network approach that is applied de facto in various educational models; and c) includes the four most often-cited components of learning networks.

Following Rovai (2002), we also obtained two further indicators: the belonging index and the learning-expectations index (each with a maximum score of 80).

The participants were also asked about how long they have been studying at their school (and were grouped in three categories: recent arrivals, students in their second year, and students who have been at the school for two or more years) and about how well they know their current classmates (categories: none of my current classmates have previously been so, one of my current classmates has previously been so, and two or more of my current classmates have previously been so).

At the end of the first term of the 2009-2010 academic year, the questionnaire was administered to the members of two groups in the first year of non-compulsory secondary education at the aforementioned high schools, which amounted to a total of 48 students (21 from Joaquín Bau 27 from Els Ports). The questionnaire was distributed using the Google Docs spreadsheet application, which facilitated the response and data-output processes.[ii]

Let us now turn to the educational context of the two groups in our sample. Joaquín Bau, the high school in Tortosa, has approximately 900 students enrolled in compulsory and non-compulsory secondary education and about 90 teachers. The school is interested in change and educational innovation. It participates in various programmes at the regional, national and international levels, including foreign-language programmes, Comenius projects and exchange programmes with other high schools in Europe, as well as ART-TIC, a programme for high-school students that explores the use of ICTs in visual arts and music. As evidence of its focus, the school is participating in EDUCAT 1x1, a pilot programme developed by the Catalan Government (as a regional manifestation of the Spanish Ministry of Education’s ‘Escuela 2.0’ programme). This programme aims to incorporate ICTs in school curricula and educational practice through the systematic use of small laptop computers in the classroom. Joaquín Bau is one of two high schools in Tortosa, which at 40,000 inhabitants is the largest city in the Terres de l’Ebre region, located in the south of Tarragona province.

Els Ports, a high school characterised by traditional educational practices, has slightly more than 200 students enrolled in compulsory and non-compulsory secondary

education and just over 30 teachers. It is in Morella, a town of 3000 inhabitants located 100 km from the cities of Tortosa and Castellón— that is, in a characteristically rural environment.

V. DATA OBTAINED

This section presents the data obtained using our SCCI (II) questionnaire. Table 1 shows the average values of the various indicators for the entire sample:

	Mean	Smallest value	Largest value	SD
<b>SCCI (out of 160)</b>	95.63	32.00	128.00	21.83
<b>Belonging index (out of 80)</b>	47.88	12.00	70.00	12.54
<b>Learning-expectations index (out of 80)</b>	47.75	20.00	72.00	11.46
<b>Learning index (out of 40)</b>	24.33	8.00	36.00	6.72
<b>Interaction index (out of 40)</b>	26.13	12.00	38.00	5.90
<b>Trust index (out of 40)</b>	25.08	4.00	36.00	7.79
<b>Spirit index (out of 40)</b>	19.96	4.00	32.00	6.14

Table 1. Learning-network indices

Table 3 presents the data by group of students (one from each high school, Joaquín Bau and Els Ports) and indicates the cases in which the differences between the two are statistically significant.

		Mean	SD	Standard error	95% conf.		Smallest value	Largest value
					Lower bound	Upper bound		
<b>SCCI</b>	<i>J. Bau</i>	82.10*	21.38	4.66	72.36	91.83	32.00	114.00
	<i>Els Ports</i>	106.15*	15.72	3.02	99.93	112.37	60.00	128.00
	TOTAL	95.63	21.83	3.15	89.29	101.96	32.00	128.00
<b>Belonging index</b>	<i>J. Bau</i>	41.81*	13.20	2.88	35.80	47.82	12.00	66.00
	<i>Els Ports</i>	52.59*	9.87	1.90	48.69	56.50	32.00	70.00
	TOTAL	47.88	12.54	1.81	44.23	51.52	12.00	70.00
<b>Learning-expectations index</b>	<i>J. Bau</i>	40.29*	10.18	2.22	35.65	44.92	20.00	58.00
	<i>Els Ports</i>	53.56*	8.81	1.70	50.07	57.04	26.00	72.00
	TOTAL	47.75	11.46	1.65	44.42	51.08	20.00	72.00
<b>Learning index</b>	<i>J. Bau</i>	20.67*	5.94	1.30	17.96	23.37	8.00	30.00
	<i>Els Ports</i>	27.19*	5.93	1.14	24.84	29.53	12.00	36.00

	TOTAL	24.33	6.72	0.97	22.38	26.28	8.00	36.00
<b>Interaction index</b>	<i>J. Bau</i>	23.33*	5.70	1.24	20.74	25.93	12.00	32.00
	<i>Els Ports</i>	28.30*	5.17	0.99	26.25	30.34	16.00	38.00
	TOTAL	26.13	5.90	0.85	24.41	27.84	12.00	38.00
<b>Trust index</b>	<i>J. Bau</i>	21.14*	9.11	1.99	17.00	25.29	4.00	36.00
	<i>Els Ports</i>	28.15*	4.87	0.94	26.22	30.07	18.00	36.00
	TOTAL	25.08	7.79	1.13	22.82	27.35	4.00	36.00
<b>Spirit index</b>	<i>J. Bau</i>	17.33*	6.01	1.31	14.60	20.07	4.00	32.00
	<i>Els Ports</i>	22.00*	5.52	1.06	19.82	24.18	10.00	30.00
	TOTAL	19.96	6.14	0.89	18.18	21.74	4.00	32.00

Table 2. Learning-network indices by high school (\*statistically significant at the 0.01 level)

Remember that the maximum scores for the various indices are as follows: SCCI, 160; belonging and learning-expectations indices, 80; learning, interaction, trust and spirit indices, 40.

Finally, Table 3 presents the data according to when the respondents first enrolled at the school (recent arrivals, students in their second year, and students who have been at the school for two or more years). Like the previous table, it indicates the cases in which the differences between the two groups are statistically significant.

		Mean	SD	95% conf.		Smallest value	Largest value
				Lower bound	Upper bound		
SCCI	New	94.50**	17.98	79.47	109.53	60.00	110.00
	<1 year	60.00**	6.00	45.10	74.90	54.00	66.00
	>2 years	98.11	20.93	91.03	105.19	32.00	128.00
	TOTAL	95.06	21.71	88.69	101.44	32.00	128.00
Belonging index	New	51.75**	10.61	42.88	60.62	36.00	66.00
	<1 year	30.67**	3.06	23.08	38.26	28.00	34.00
	>2 years	48.28	12.58	44.02	52.53	12.00	70.00
	TOTAL	47.74	12.65	44.03	51.46	12.00	70.00
Learning-expectations index	New	42.75*	9.68	34.66	50.84	22.00	52.00
	<1 year	29.33*	5.77	14.99	43.68	26.00	36.00
	>2 years	49.83*	10.24	46.37	53.30	20.00	72.00
	TOTAL	47.32	11.18	44.04	50.60	20.00	72.00
Learning index	New	21.75*	6.63	16.21	27.29	8.00	30.00
	<1 year	12.67*	5.03	0.16	25.17	8.00	18.00
	>2 years	25.56*	5.64	23.65	27.46	12.00	34.00
	TOTAL	24.09	6.57	22.16	26.01	8.00	34.00
Interaction index	New	26.75	5.65	22.03	31.47	16.00	32.00
	<1 year	19.33	4.16	8.99	29.68	16.00	24.00
	>2 years	26.50	5.92	24.50	28.50	12.00	38.00
	TOTAL	26.09	5.96	24.34	27.83	12.00	38.00
Trust index	New	26.75	7.85	20.19	33.31	14.00	36.00
	<1 year	14.67	4.16	4.32	25.01	10.00	18.00
	>2 years	25.33	7.48	22.80	27.87	4.00	36.00
	TOTAL	24.89	7.77	22.61	27.17	4.00	36.00
Spirit index	New	20.50	6.12	15.39	25.61	14.00	32.00
	<1 year	12.67	2.31	6.93	18.40	10.00	14.00
	>2 years	20.33	6.13	18.26	22.41	4.00	30.00
	TOTAL	19.87	6.18	18.06	21.69	4.00	32.00

Table 3. Learning-network indices by time at the school (\*statistically significant at the 0.01 level; \*\*statistically significant at the 0.05 level)

We have chosen not to include a table showing the data on previous relationships among the participants because the aforementioned data that, when it comes to the formation of bonds, the time a student spends with the learning network as a

comparison did not yield any large or significant differences. As discussed in our conclusions, we deduce from the group is more important than a previous relationship with any of the members.

slightly lower, are in agreement with Rovai’s findings for the face-to-face group.[iii]

## VI. DISCUSSION AND ANALYSIS

Because all of the values for all of the indicators are above average, we can deduce that, from the very beginning of the academic year, the students are immersed in the process of creating their respective learning networks. Thus, regardless of the school and, therefore, the methodologies employed, it is possible to determine the extent to which students feel committed to the consolidation of groups that, due to a shared interest in learning, are likely to ultimately evolve into true learning networks.

A detailed analysis of each of the indices shows that our sample obtained an overall SCCI score of 95.63 out of a possible 160 points, which is a value well above the average. Given that the test was distributed to the participants during the first term of the academic year—rather than at the end of the year, when researchers traditionally investigate the existence (or non-existence) of learning networks—these findings can be interpreted optimistically. Nevertheless, due to the high value of the standard deviation in this case (21.83), caution should be exercised in drawing conclusions. Some members of the sample reported values well above the average, and for those individuals, therefore, we can say that a learning network has in fact been created. However, other students reported decidedly low, below-average values, and for those individuals we can say that day-to-day contact with their classmates in a school environment was not enough to make them feel like an integral part of a group with shared interests, objectives and benefits.

In keeping with the above analysis, similar values were obtained for the belonging index and the learning-expectations index: 47.88 and 47.75 out of a possible 80 points, respectively. These findings indicate that the participants have an above-average sense of community belonging and level of confidence that the network will provide them with learning benefits.

Finally, the learning, interaction and trust indices all had above-average values, although the spirit index fell just short of this mark with a score of 19.96 (out of a possible 40 points). With 26.13 points, the interaction index had the highest value of these four indicators. This reflects the well-known fact that high schools are important places for the interaction of students (whether for academic reasons or as part of the social networks that students establish in their personal lives); however, the question is whether this fact necessarily translates into a strong and tangible feeling that this interaction will lead to improved learning outcomes.

Table 4 compares our data with those obtained by Rovai (2001), who attempted to determine to what extent the virtual nature of some learning networks is not an obstacle to but rather a source of cohesion for their members. Although our purpose has little in common with Rovai’s, a comparison between the findings of the two studies provides a point of reference. The comparison shows that our values, although

Variables	Face-to-face group		Virtual group	
	Mean	SD	Mean	SD
<i>Spirit</i>	27.28	6.17	33.35	4.11
<i>Trust</i>	26.39	6.12	32.10	4.72
<i>Interaction</i>	30.00	5.91	33.30	3.34
<i>Learning</i>	30.83	5.11	34.10	4.96
<b>SCCI</b>	<b>114.50</b>	<b>21.37</b>	<b>132.85</b>	<b>15.17</b>

Table 4. Learning-network indices in Rovai (2001: 113)

Let us now turn to the differences found between the two high schools. Notably, the differences found in all of the indices were statistically significant ( $p < 0.01$ ) and, moreover, were all in the same direction. The indicators of Els Ports had much higher values than those of Joaquín Bau: 106 versus 82 for the SCCI; 53 versus 42 for the belonging index; 54 versus 40 for the learning-expectations index; 27 versus 21 for the learning index; 28 versus 23 for the interaction index; 28 versus 21 for the trust index; and 22 versus 17 for the spirit index. This comparison shows that Els Ports is consistently closer to the values that would indicate the creation of a true learning network; in contrast, Joaquín Bau is in the range of what Johnson & Johnson (1999) would call a pseudogroup or what Henri & Pudelko (2002) would call a community of interest.

An analysis of the sensitivity of these indices to the students’ number of years at the school reveals some very interesting trends. First, statistically significant differences were found in the general indices, but not in the sub-indices (interaction, trust and spirit, with the exception of learning). The average values for each of these indices indicate that the feeling is stronger in students who have been at the school for two or more academic years. However, the progression was not, as expected, linear, because the lowest values were not obtained for recent arrivals but rather for students who had only spent one academic year with their current classmates; moreover, the standard deviation was consistently lower for this group of students, which suggests considerable uniformity of opinion in this regard. The SCCI was 98 for students who had been at the school for more than two academic years, 94 for recent arrivals, and just 60 for students in their second year; the same gradation can be found in the belonging index (with values of 48, 52 and 31, respectively) and the learning-expectations index (with values of 50, 43 and 29, respectively). These data suggest that the novelty of a new arrival is second only to a history of two or more academic years at the school in terms of boosting group cohesion. The effect of this novelty is even stronger than the effect of a short time at the school. That is, upon arrival at the school, students quickly decide that they feel like a part of the group; during their second year at the school, distrust manifests itself; and finally, during the third year, they begin to feel, definitively, that they are part of the learning network.

Before returning once again to the objectives of this study, let us point out that the type of school has a major influence on the creation of stable learning networks. Future studies should consider whether this influence holds regardless of the methodologies used during teaching-learning activities in the course of day-to-day work at the school. It seemed reasonable, a priori, to suspect that bonds unrelated to the learning process itself could have a specific effect on the formation of stable work groups, and that these bonds could strengthen the existing ties between the members of an emerging learning network. Our study has demonstrated that this effect does, in fact, exist and is very intense (by showing that the differences between the two groups were statistically significant for all indices,  $p < 0.01$ ). At Els Ports, the students involved in the teaching-learning process had closer relationships; as a result, they trusted more in their peers and experienced a greater spirit of group belonging, and therefore were more certain that their classmates' learning would, in most cases, have an equivalent impact on their own learning. At Joaquín Bau, in contrast, clear-cut educational planning using methodologies that promote collaborative work had a smaller effect on the results than did the specific environment of a high school like Els Ports. Nevertheless, this planning does yield results. Despite being located in an urban area, where both students and

synchronous or asynchronous chat applications, etc., are very appropriate for this purpose).

If, as asserted by Fálces & Palenzuela (2004), the school is, a priori, the entity that has the greatest effect on the dynamics of a learning network, then it is essential to be aware of a school's nature when designing and planning its educational programme, in order to strengthen its potential and counteract its inherent obstacles. As noted by Duarte (2009: 1), 'the true transformation is found in the educational dynamics, in the educational process carried out in the classroom', and in this regard schools are indeed solely responsible.

## VII. NOTES

[i] Dr. Juan González Martínez, Dr. Cinta Espuny Vidal, Dr. Luis Marqués Molías and Dr. Mercè Gisbert Cervera belong to the Applied Research Group in Education and Technology (ARGET) at Rovira i Virgili University (ID number: 2009 SGR 596).

[ii] As a tool, this digital questionnaire is compatible with the current trend towards the integration of electronic resources in a Web 2.0 environment and also, therefore, with the philosophy of delegation that is characteristic of the auxiliary platforms of the blended-learning model. It is noteworthy for its broad range of potential uses, including, most importantly, the following: 1) it is a questionnaire format that easily allows modifications of all sorts; 2) although we have used questions with a numbered scale of possible answers (as conceived in the SCCI) because this facilitates subsequent statistical data treatment, the tool allows many other types of response which makes it possible

teachers far outnumber their counterparts at the rural high school, Joaquín Bau is certain to see academic results if it promotes the incipient process of learning-network creation. Still, in general terms, the two schools cannot be described as having analogous situations.

Therefore, if we conclude that the type of school is an important conditioning factor that has a major influence on the creation of learning networks, we must also accept that small rural schools serving a limited population, where bonds formed at school can easily be strengthened outside of the classroom and vice versa, will be more likely to incubate such networks. And conversely, large urban schools will find that their very nature is an obstacle to the spontaneous growth of on-campus learning networks. In relation to our second objective, we have shown that small rural schools are especially well-suited to teaching-learning activities based on collective work, whereas large urban schools should be prepared, when planning such activities, to take special measures if their objective is for students to establish true learning networks. Such measures may include creating stable work groups that continue to work together throughout the year and planning and designing activities that involve procedures for fostering interaction both inside and outside of the classroom (certain ICTs, such as blogs on classroom-related topics or other experiences, wikis

to envision, in future studies, the introduction of (for example) broad, open-ended questions that would allow the respondents to introduce glosses or nuances; 3) the application analyses the data as they are introduced, which offers the questionnaire's author a preliminary form of statistical treatment; 4) as a complement to the questionnaire, the application generates a spreadsheet that can easily be exported to the most common freeware or proprietary data-processing software formats, thereby indirectly allowing an even more in-depth processing of the data using statistics packages such as PASW and StatGraphics Centurion; 5) from the viewpoint of the respondent, the digital format is convenient and easy-to-use; and 6), because the questionnaires are stored in the spreadsheet application of the Google Docs environment, they can easily be shared, modified and distributed.

[iii] Although we have already mentioned this elsewhere, we want to reiterate that it would be interesting to be able to precisely determine the impact of the timing of the questionnaire on the disparity of the values obtained. In Rovai's (2001, 2002) studies, the questionnaires were administered at the end of the academic year with the intention of detecting the consolidation of the learning networks. In contrast, the questionnaires in our study (see Section 6) were administered at the end of the first term of the academic year for the purpose of identifying problems in the establishment of the work groups.

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