

ENHANCING (IN)FORMAL LEARNING TIES IN INTERDISCIPLINARY MANAGEMENT COURSES: A QUASI-EXPERIMENTAL SOCIAL NETWORK STUDY

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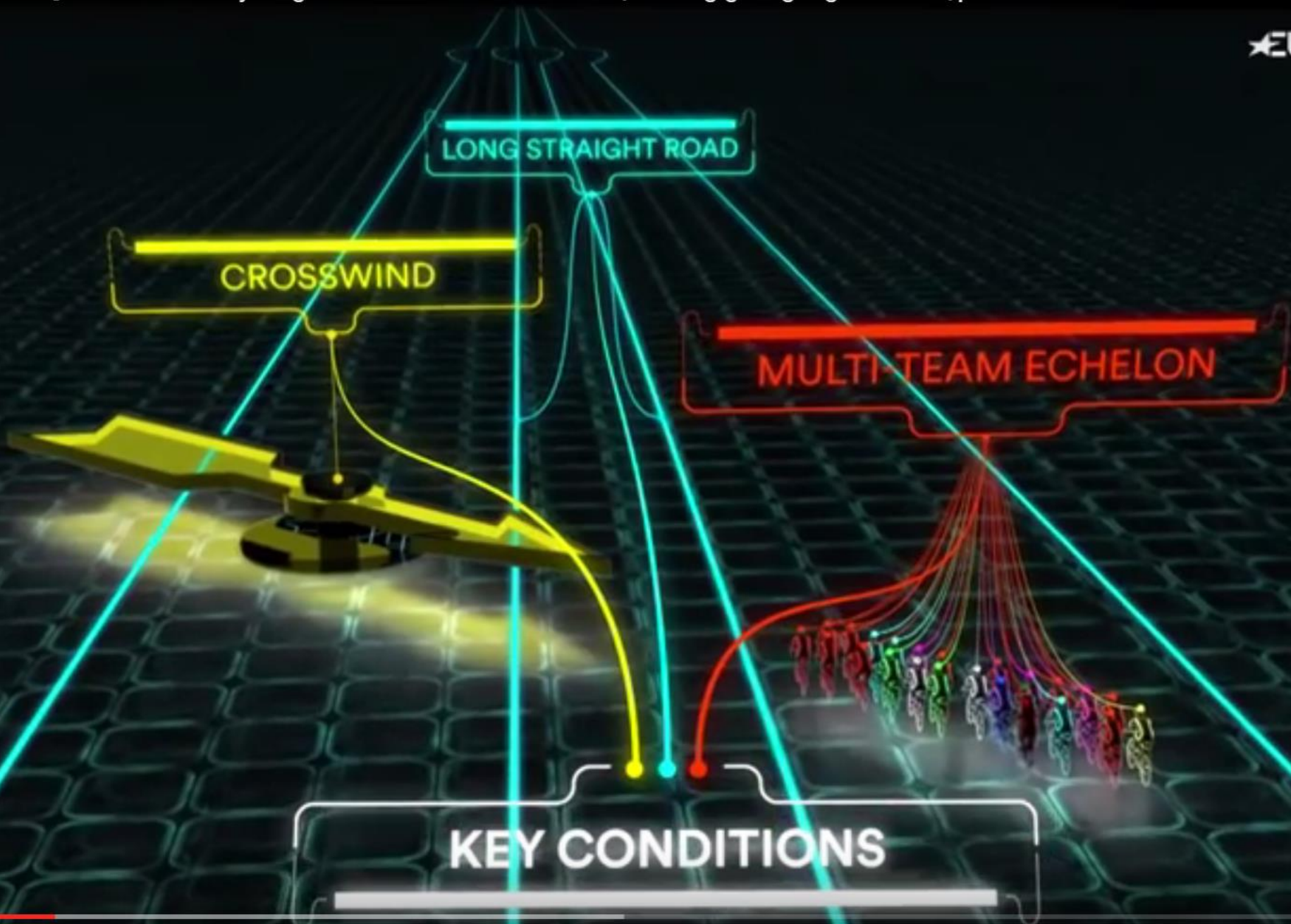
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Life-changing Learning
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Background

- Wide acknowledgement graduates need **interdisciplinary perspectives**, approach problems from **multiple vantage points** (Borrego and Newswander 2010, Boni, Weingart, and Evenson 2009), and **synthesise knowledge from different disciplines** (Kurland et al. 2010)
- Higher education is “under growing pressure to provide graduates with opportunities to complement discipline-based competency with multidisciplinary and interdisciplinary skills” (Pharo et al. 2012, 498).
- Limited empirical evidence available as to how interdisciplinary graduate programmes can effectively create and educate interdisciplinary graduates (Borrego and Newswander 2010, Kalfa and Taksa 2013).
- Interdisciplinary is defined as “a means of solving problems and answering questions that cannot be satisfactorily addressed using single methods or approaches” (Klein 1996)

Background

- Establishing common ground between different disciplines is typically achieved in interdisciplinary courses by **common experience** in coursework, seminars (e.g., Boni, Weingart, and Evenson 2009, Kurland et al. 2010).
- Most interdisciplinary programmes use **group-learning** to encourage interdisciplinary learning (Decuyper, Dochy, and Van den Bossche 2010, Michaelsen and Richards 2005).
 - By putting students from different disciplines together in groups to work on complex, authentic interdisciplinary tasks supported by a teacher, the assumption is that over time students will “acquire by osmosis” interdisciplinary skills and knowledge.
- Most of 134 interdisciplinary programmes reviewed **lacked a system thinking approach** of integration of knowledge from different disciplines, and an **absence of evaluation mechanisms** to understand whether or not the learning outcomes of the programmes were achieved (Borrego and Newswander, 2010).



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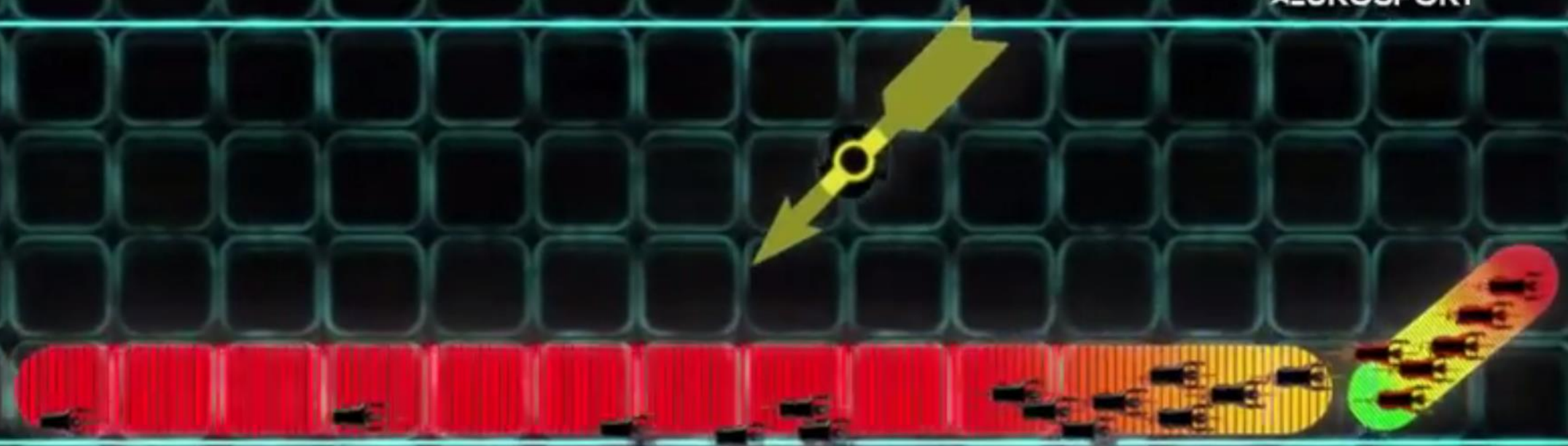
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Background

- Prime goal: to analyse whether students from different management, hospitality and health care programmes developed (or not) learning ties with students from the same or a different discipline over time in a large interdisciplinary organisational behaviour module.
- Second goal: can teachers actively encourage and intervene in interdisciplinary learning by adjusting the group selection method?

Hypotheses

- H1: Group allocation impacts how students develop social networks.
- H2: Learning within disciplines is a stronger driver for social network development than the actual group allocation.
- H3: In the balanced condition, students maintain more ties inside their group in comparison to the random condition.
- H4: In the random condition, more interdisciplinary ties are maintained by students.
- H5 Developing and maintaining more interdisciplinary ties (in particular learning) lead to better performance, in particular for the balanced condition.



FULLY EXPOSED TO WIND

Methods

- Compulsory Master module of Organisational Behaviour at a UK business school during the autumn semesters of 2011 and 2012.
- First module in the programme and students had not formally worked together before.
- In this quasi-experimental study, the implementation of 2011 is referred to as the “random condition”, whereby the teacher randomly assigned students to groups
- Implementation of 2012 is referred to as the “balanced (experimental) condition”, whereby we artificially balanced 37 groups based upon the initial friendship network that was measured after four weeks.
- In both conditions, during the eleven week module the 377 Master students met formally once a week during a three-hour interactive lecture.

Methods

- Students were given one group task per week at the end of each lecture to further develop their understandings of the lecture topics.
- 8 tasks in total, including case studies, essay types of questions, and focused group discussions. These group activities aimed to facilitate knowledge sharing and to develop breadth and depth of students' subject knowledge through an interdisciplinary lens.
- Group products were not formally assessed, but the teacher did provide formative feedback online (e.g. giving constructive feedback to each group) and in class (e.g. collectively comment on the group answers) each week.
- Except for the group selection method (i.e. random selection vs. balanced), the assessments, module materials and the teacher were the same in both conditions.

Methods

- 67% of the participants were female, and the average age was 25.50 (SD = 5.10), ranging from 21 to 56.
- Six different programmes: International Hotel Management (IHM = 54%), Health Care Management (HCM = 13%), Entrepreneurship (EP = 12%), Food Management (FM= 8%), Intercultural Communication with International Business (ICIB = 7%), and a final group of students following a range of smaller programmes, which are clustered under the umbrella term Business Management (BM = 5%).
- Alongside this module, students also followed either two or three modules in their own programme in the first semester.
- **Social networks and ties**
 - Students answered the Social Network question stem “I am a friend of ...” after four weeks by using a “closed-network” analysis (Krackhardt and Stern 1988, Rienties and Nolan 2014). A list with names of all the students was provided as is commonly done in SNA (Curşeu, Janssen, and Raab 2012, Bevelander and Page 2011, Rienties, Heliot, and Jindal-Snape 2013). Second, learning from group members and other members was also measured in Week 4 by the question stem “I learn a lot from ...”. Third, working relations were measured by the question stem “I work a lot with”.
 - In line with Bevelander and Page (2011) we again measured the three networks at the end of the module at week 11 (i.e. post-test). Students who did not attend the classes when the questionnaire was distributed received the questionnaire(s) via email.
 - For the two measurement periods, a response rate of 89% and 84% were established in 2011 and 84% and 76% in 2012.
- **Academic performance**
 - Measured by a written essay of 1000 words (students chose one essay question out of three) and a closed book examination (students answered two questions out of a choice of six).

Figure 1 Social network of learning after four weeks in random condition

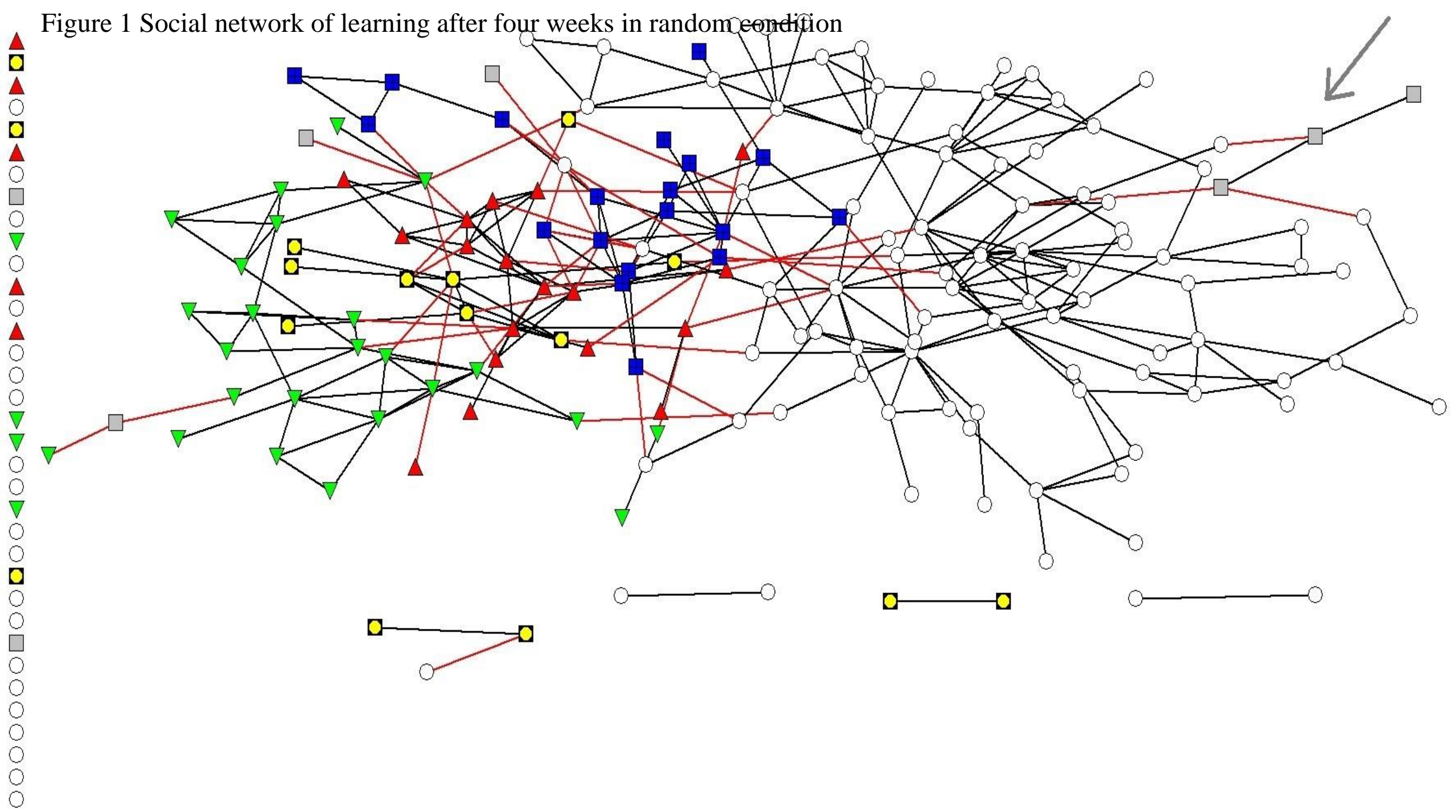


Figure 2 Social network of learning after eleven weeks in random condition

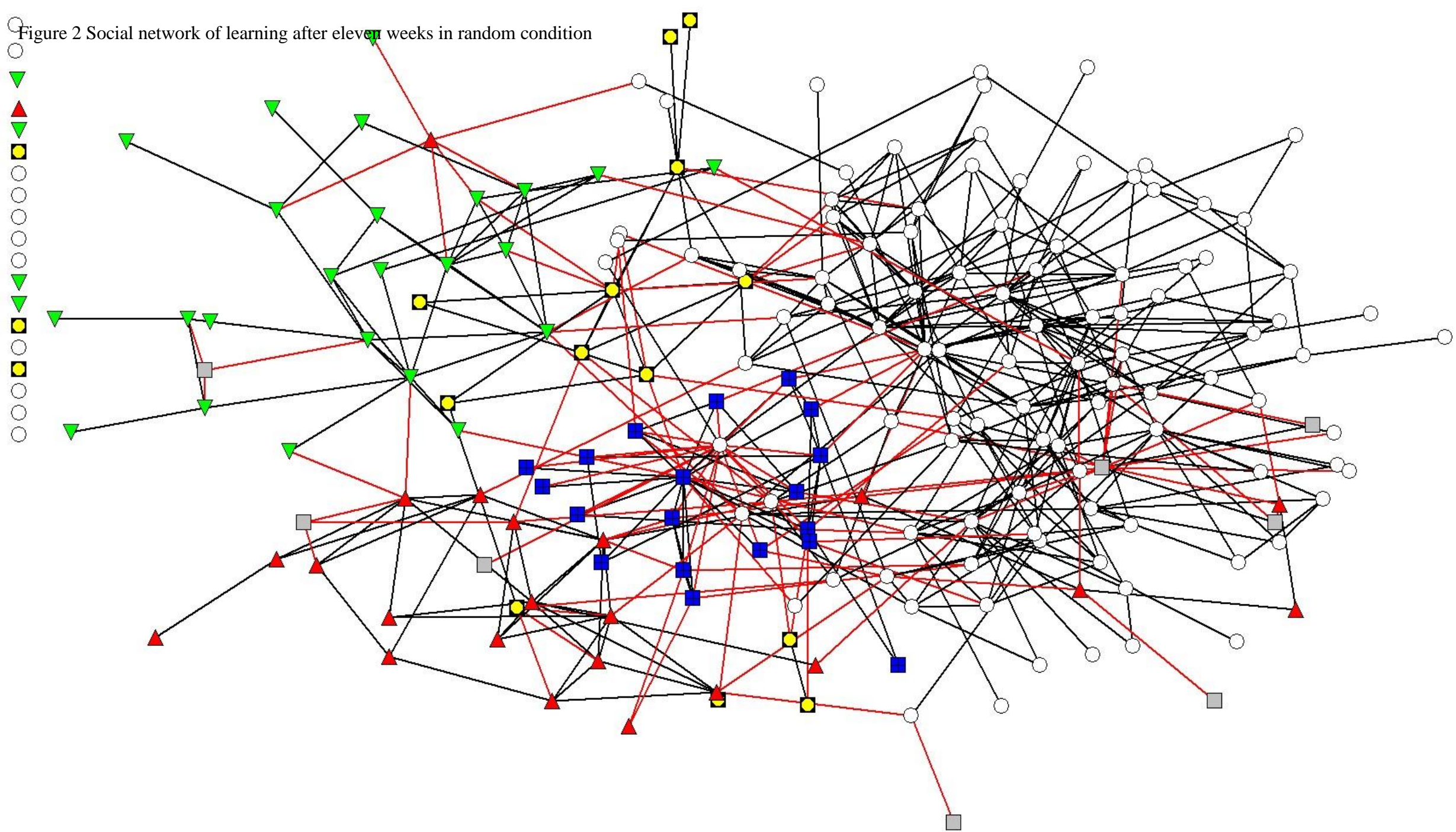


Figure 3 Social learning network after four weeks in balanced condition

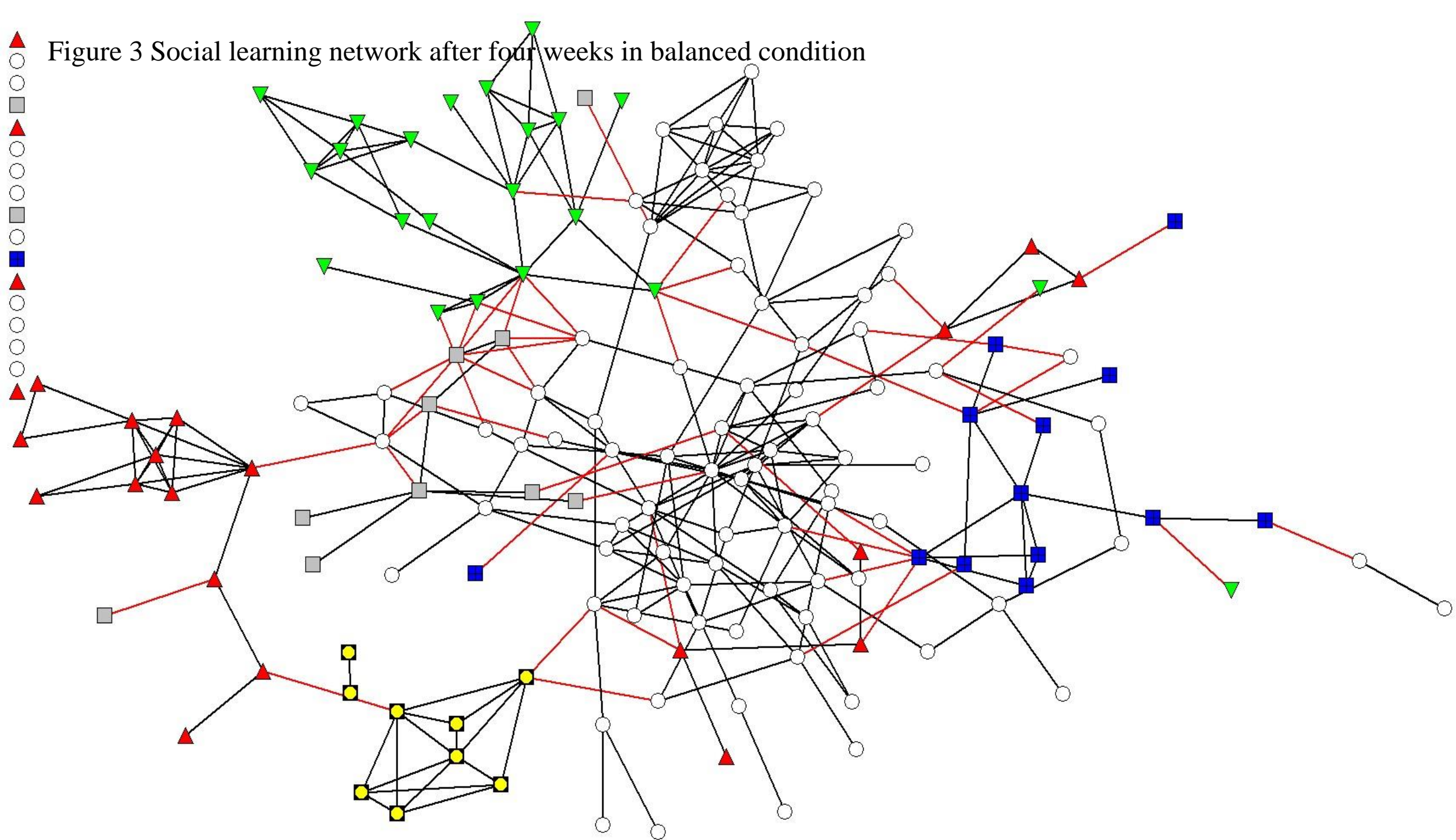


Figure 4 Social learning network after eleven weeks in balanced condition

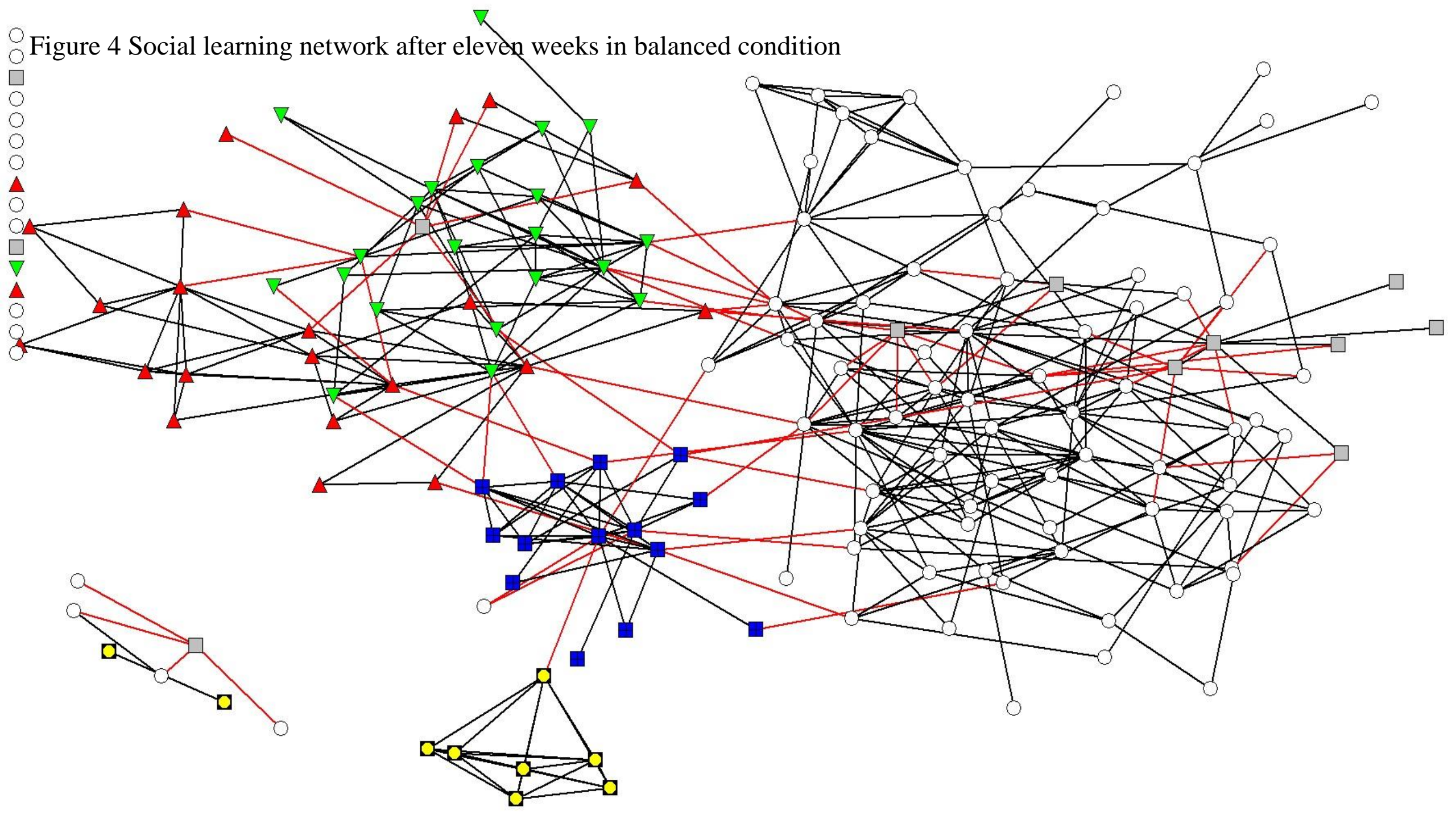




Table 2 Multiple regression quadratic assignment procedures of learning after eleven weeks.

	<u>Random condition</u>			<u>Balanced condition</u>			<u>Combined</u>
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
GLOBE proxy	.019*	.004	.001	.017	.005	.001	.001
H1 Same Group	.029***	.027***	.029***	.115***	.053***	.044***	.038***
H2 Same Discipline	.095***	.049***	.050***	.127***	.071***	.064***	.070***
Initial Friendship		.311***	.169***		.379***	.209***	.203***
Initial Learn			.137***			.228***	.173***
Initial Work			.128***			.071***	.126***
Intervention							.005
R ² adj.	1	11	14	3	17	22	20
ΔR ² adj.	-	10	3	-	14	5	-

MRQAP of random (n = 207) vs. balanced condition (n=170). Combined consists of both networks (n=377), standardised betas. * $p < .05$, *** $p < .001$



Results

Table 1 Friendship and learning ties based upon (inter)discipline (random vs. balanced condition)

	Random		Balanced		F-value	η^2
	M	SD	M	SD		
<i>During the fourth week</i>						
Same discipline friendship ties	5.06	3.64	5.22	3.35	.196	.001
Interdisciplinary friendship	1.49	2.13	1.27	1.70	1.163	.003
E-I friendship ties	-0.52	0.55	-0.60	0.47	2.275	.006
Same discipline learning	2.37	2.21	2.84	2.30	4.043*	.011
Interdisciplinary learning	0.52	0.97	0.56	0.97	.183	.000
E-I learning	-0.55	0.55	-0.57	0.56	.082	.000
<i>After eleven weeks</i>						
Same discipline friendship	6.64	4.77	6.14	3.93	1.180	.003
Interdisciplinary friendship	2.07	2.53	1.52	2.05	5.217*	.014
E-I friendship relations	-0.52	0.53	-0.60	0.48	2.506	.007
Same discipline learning	3.46	3.09	3.79	2.95	1.107	.003
Interdisciplinary learning	1.05	1.81	0.73	1.21	3.996*	.011
E-I learning	-0.49	0.57	-0.60	0.52	3.809*	.010

ANOVA of Random (n= 207) vs. balanced condition (n= 170). *p < .05.

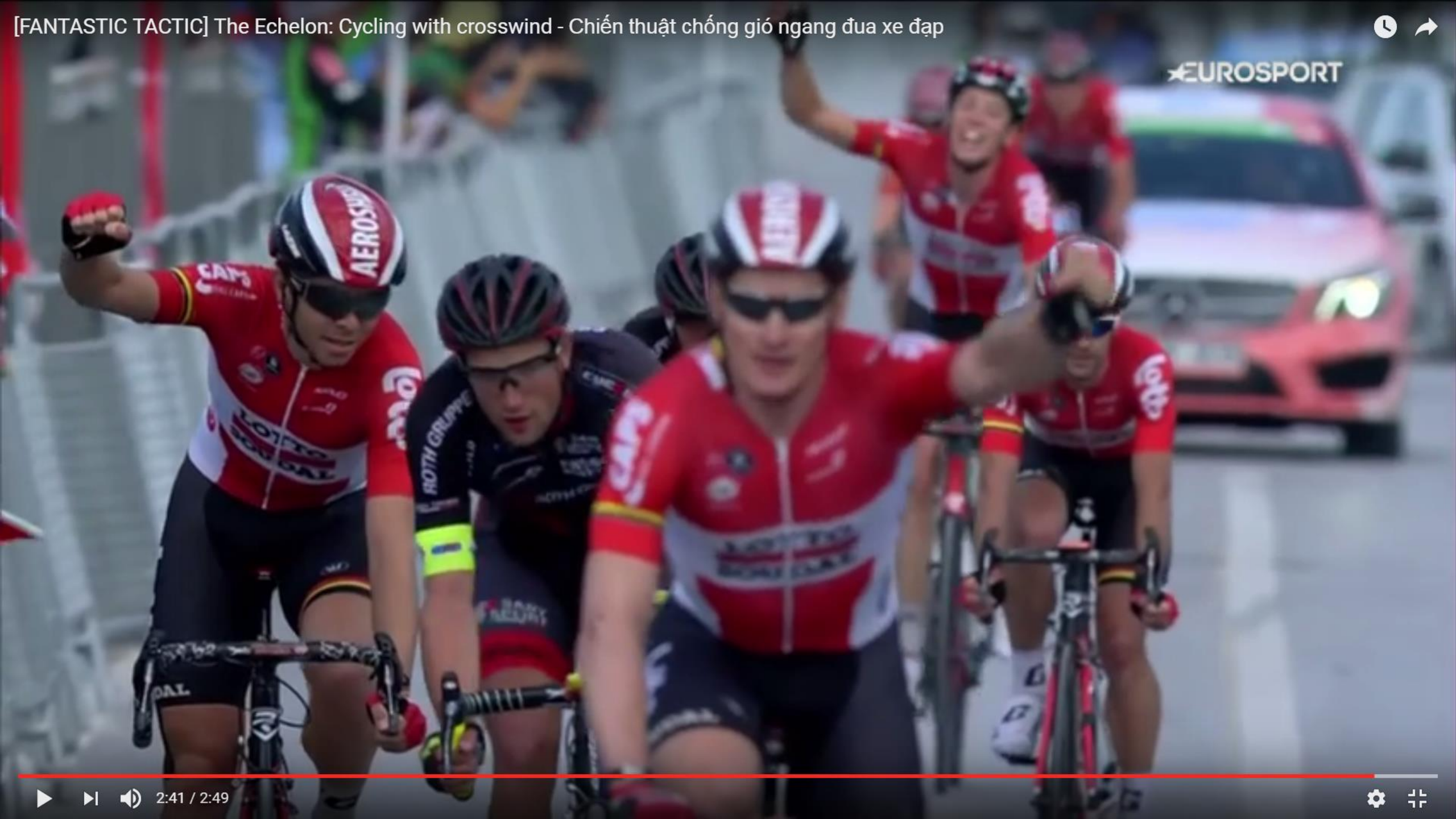


Table 3 Regression analysis of academic performance.

	Model 1	Model 2	Model 3	Model 4
Gender	.147**	.133**	.129*	.137**
Individualism (Culture) ¹	.296**	.308**	.307**	.310**
Masculinity (Culture)	-.054	-.066	-.068	-.064
Intervention	-.054	-.028	-.030	-.028
Number of ties (Pre) ²		-.046	-.050	-.029
Number of ties (Post)		.239**	.240**	.247**
E-I discipline (Pre)			.001	
E-I discipline (Post)			-.028	
Ties (Pre) * E-I (Pre)				.023
Ties (Post) * E-I (Post)				.020
N	364	364	364	364
R ² adj.	9	13	13	13
ΔR ² adj.	-	4	0	0

¹For controlling cultural differences, we used Hofstede's individualism vs. Collectivism and masculinity vs femininity index

²The number of ties and E-I Index for disciplines were computed as average score of the three social networks.



Discussion and practical implications

- Initial ties formed during the first couple of weeks had a strong impact on with whom students from different programmes learned over time.
- Instructional design indicated a small effect on how students from different disciplines developed formal and informal learning and friendship social networks.
- In terms of the first goal, although more interdisciplinary friendships and learning ties were developed over time in absolute numbers, in relative terms most students continued to primarily learn from their same-discipline fellow students, irrespective of the type of intervention.
- In line with social identity theory (Tajfel 1978), most students preferred to nurture ties with same discipline students.
- In other words, in our context we found that the creation of an interdisciplinary platform for students to meet and discuss and work together on a range of interdisciplinary projects did not lead to automatically increased interdisciplinary social networks or enhanced academic performance, providing limited support for H3-H5.

Discussion and practical implications

- To the best of our knowledge, we are the first to empirically test and verify that putting students into interdisciplinary groups and classes does not “automatically” lead to the desired interdisciplinary exchange of ideas, developments of interdisciplinary social networks, or enhanced academic performance.
- Given the high response rates, the consistent findings in both settings, and the conservative SNA techniques used, our findings indicate that the developments of interdisciplinary social networks need more than just opportunities for interdisciplinary exchange and a range of group tasks.
- Perhaps a more structured approach in terms of summative group assessments, combined with extensive support and coaching (Boni, Weingart, and Evenson 2009, Decuyper, Dochy, and Van den Bossche 2010) may help students to develop these interdisciplinary social networks.
- The issues of trust in the understanding of students’ social networking activities (Bevelander and Page 2011) may offer another explanation for the lack of increased interdisciplinarity.

Discussion and practical implications

- This study promotes a friendship-sensitive view of student's knowledge sharing that recognises the importance of friendships/power within networks (Katz et al. 2004, Hommes et al. 2012, Borgatti and Cross 2003) of practices in interdisciplinary learning environment.
- This has important implications for course instructors, who need to consider the role of social identity (e.g., disciplines, groups) when designing interdisciplinary modules.
- Given that most students in our context preferred to continue to work with students from their same discipline (irrespective of the type of group selection method), if higher education wants to create graduates who are able to work across many disciplines, more than just lip-service to interdisciplinary learning is urgently needed