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Fostering participation in learning networks by using reward systems and face-to-face meetings

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Abstract

This paper investigates conditions for increasing participation in learning networks. 'Lessons learned' over a period of almost five years are phrased as recommendations for future learning network implementations. We describe three generations of facilities designed to promote learning of educational modelling languages, from a conventional website through a community site offering facilities for collaboration towards a learning network for the effective exchange of information. The paper focuses on the influence of incentive mechanisms and face-to-face meetings on participation in the LN4LD (Learning Network for Learning Design). These interventions are explained from Self-Organization and Social Exchange Theory. Repeated measurements show that the levels of both passive (accessing and reading information) and active participation (posting, replying and rating) are indeed significantly increased as a result of both interventions. Both the use of reward systems and face-to-face meetings can therefore be considered as valuable 'add-ons'.

1. Introduction

Today's lifelong learner is in a constant need to update knowledge and competences, given certain personal or employment-related motives [1,2]. Online, distributed lifelong facilities can be designed that cater for these needs at various levels of competence development. However, merely introducing such facilities will not suffice. Potential learners should also be motivated to actually use and actively contribute [3]. So called 'free-riding' or 'lurking' is one of the main problems in online learning [4].

The factors and mechanisms that motivate people to codify and share knowledge for the benefit of others

have been identified as a priority area for individual companies [5]. They represent the most commonly discussed topic amongst practitioners and academics at conferences on knowledge management [6]. To some, the encouragement of employees to contribute knowledge is even more important than the more technical (interoperability) issues related to its capture, storage and dissemination [7]. What might then motivate an individual to participate actively in a Learning Network, to respond to others' questions, to contribute content, complete activities, carry out assessments?

This paper addresses some conditions for setting up facilities for the development of lifelong learning competences (i.e., for building a learning network), and describes two mechanisms to further increase (active) participation in such learning networks (i.e., reward systems and complementary face-to-face meetings).

This paper sets off by describing some preliminary experiences (period: 2001-2004) in setting up facilities to promote learning in the area of educational modeling languages in section 2. Self-organization and Social exchange will be introduced as theories that provide us with guidelines to increase active participation. Sections 3 and 4 then describe two more recent (period: 2004-2005) experimental studies we carried out on the additional use of reward systems and face-to-face meeting to increase participation. Finally, section 5 provides a summary of our findings, together with recommendations for future research.

2. Initial experiences

The Open University of the Netherlands (OUNL) launched Educational Modeling Language (EML) [8] for public use in December 2000, as a specification that enables modeling of both content and processes in e-learning. To promote use in contexts outside of OUNL, a website (eml.ou.nl) was created through which the

specification could be downloaded and from which newsletters were sent to subscribed participants. In the years 2001 and 2002 the amount of subscribers gradually grew towards a number around 2800. Although many subscribers regularly visited the website to download or study additional information, no channel was available to seek guidance, share experiences, offer examples, and help distribute the load of training about EML beyond the originators of the specification.

In order to open up possibilities for guidance and exchange, the subscribers were migrated onto another platform (www.learningnetworks.org) offering fora to post and receive messages, implemented in VBulletin [9]. The new facility was promoted in 2003 and 2004, but the number of subscribers only slightly grew to a little over 3000. The amount of page views per day (passive participation) numbered several thousands, which we considered to be quite satisfactory. However, the number of contributions made (besides those made by the originators of the facility) by posting or replying to posts (active participation) remained extremely low (i.e., 20 and 11 respectively).

We concluded that making communication channels available alone does not guarantee that participants will take a more active role. These initial experiences with participants not contributing, but merely ‘lurking’ the network, led us to take a different approach towards implementing a learning network based on ideas around self-organizing systems and ‘seeding’. In the meantime, EML had been adapted to become an internationally standard known as IMS-Learning (LD) [10]. The first pilot implementation of the learning network therefore became known as LN4LD (Learning Network for Learning Design). We used a combination of PHP-Nuke [11], to implement the learning network-layer of the facility, and Moodle [12], to implement the learning activities and fora.

2.1. Self-organizing social systems

In literature on building effective learning environments there is some dispute about the amount of structure that is needed for effective learning. Some researchers [13, p.450] state that for effective problem-solving during collaboration there “... seems to be a need to structure the learning in small group interaction in advance in a way that will prompt students to elaborate the problem, reflect on the solution process, and really construct relationships between prior and new knowledge”. However, by which means and to which extent collaboration should be structured in advance, whether this should be face-to-face or

computer-supported, how individual and group support could be balanced, and what ‘collaborative tools’ could be applied in collaboration remain largely unresolved issues. Wiley and Edwards [14] investigate the potential of Online Self-Organizing Social Systems (OSOSS) in which students provide each other with peer feedback without any guiding authority, such as learning through Collaborative Problem Solving (CPS). According to Nelson [15] the attributes of the ideal CPS learning environment are conducive to collaboration, experimentation, and inquiry, an environment which encourages an open exchange of ideas and information. Wiley and Edwards focus their research on web-based CSCL infrastructures, that are considered as a ‘fertile primordial soup’ from which OSOSS can just ‘simply’ emerge without a central authority adding content, commentary, structure or user support in advance. We took an intermediate stance by adding some initial content and structure to ‘seed’ the information space for others to add and elaborate, based on the concept of ‘courses as seeds’ [16, 17].

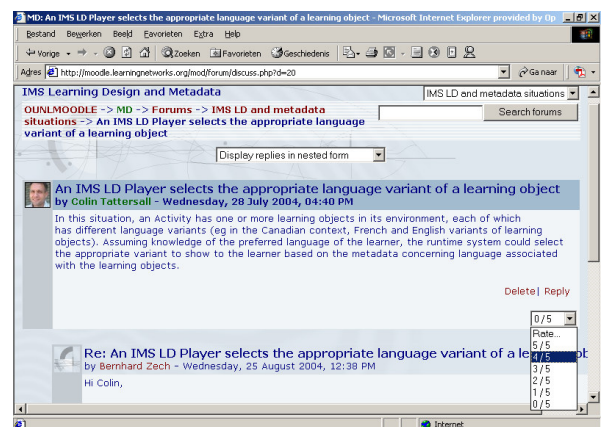


Figure 1. Rating in a Moodle forum

Before launching LN4LD (in July 2004), we ‘seeded’ the learning network with five initial learning activities containing fora, assignments, additional information, and some self assessment questions. Activities were offered as Moodle courses. When specific discussions arose, each member was allowed to create new activities, like the instigators did for ‘IMS Learning Design and meta data’. It was possible to rate activities (in PHP-Nuke) and individual postings or replies (in Moodle, like is depicted in Figure 1).

2.2. Participation in LN4LD: initial data

An initial, small group of 104 users who subscribed was monitored during the first three months after

launching LN4LD (July-September 2004). For a more elaborate treatment of this study see [18]. Again, passive participation was much higher than active participation. We counted 12,011 page views, and people downloaded 427 items. Only 25 articles were posted in both Nuke and Moodle fora. Besides the instigators, no other users created new activities themselves. Exchange of information on the level of active participation in LN4LD was still quite disappointing, although it was a substantial improvement when compared to its VBulletin predecessor. For instance, when we take the (number of active posts / number of registered users) ratio as a measure we observe an increase from 5% to 50% over both facilities.

Possible problems underlying the disappointing numbers of participants and low level of active participation were identified: relative invisibility of policy statements; various usability issues in registering and wayfinding (due to the rather complex two-layer Nuke-Moodle infrastructure); lack of suitable content (content was found to be at a rather complex level and mainly text-oriented); complex structure (too many assignments and fora for too little users).

3. Reward systems

After the study period of three months, we continued monitoring participation during the following period of three months (October 2004-January 2005), in a second, improved pilot implementation (www.ln4ld.learningnetworks.org) of the LN4LD. During this latter period, we carried out experimentation with an incentive mechanism aimed to increase active participation.

3.1. Social Exchange Theory

Experimentation was inspired by Social Exchange Theory, which informs us that participants will contribute more when there is some kind of intrinsic or extrinsic motive (or reward) involved. This theory [19, 20] comes from economics' rational choice theory, suggesting a relation between a person's satisfaction with a relation (i.e., with the learning network) and a person's commitment to that relation (i.e., his willingness to actively participate). It furthermore suggests four main mechanisms to motivate and encourage participation: (1) *personal access*, or anticipated reciprocity: learner has a pre-existing expectation that he will receive actionable and useful (extra) information in return; (2) *personal reputation*: learner feels he can improve his visibility and influence

to others in the network, e.g. leading to more work or status in the future; (3) *social altruism*: learner perceives the efficacy of the LN in sharing knowledge as a 'public good', especially when contributions are seen as important, relevant, and related to outcomes; (4) *tangible rewards*: learners negotiate to get some kind of more tangible asset (financial reward, bond, book, etc) in return. Other distinctions have been made between: individual (access, reputation, reward) versus interpersonal factors (altruism) [21, 22]; hard (e.g., access, money) versus soft (e.g., satisfaction, altruism) rewards [23]; quantitative versus qualitative gain, intrinsic versus extrinsic factors, and others. In each of the above cases, incentive mechanisms for knowledge sharing should match the spirit of what has to be achieved [24]. If this is finding and exchanging information about LD, research suggests that incentives to gain extra personal access to more information about LD can be expected to render best results.

3.2. Participation in LN4LD: when introducing a reward system

To test this assumption, we introduced an incentive mechanism in LN4LD (participants could earn extra access by making contributions). We divided the three-month period in three consecutive periods of one month to monitor our participants, with the incentive mechanism only being introduced and available during the middle period. The sample used for this study consisted of all 125 individuals who had enrolled and accessed the Learning Network during the experimental period. Seventeen countries were represented as the origin of participants. For a more elaborate treatment of this study see [25].

The mechanism allowed participants to earn points for contributions, with the reward scheme including both quantitative and qualitative components. On the quantitative side, points could be earned for (1) forum postings (20 points for each, labelled 'pointsforpost'); (2) replying to posts (10 points for each, labelled 'pointsforreply'); and (3) rating of posts (3 points for each, labelled 'pointsforrate') (see Figure 1). With respect to the quality of postings, contributors received additional points: (4) each time their contribution prompted a reply (5 points for each reply to a post, labelled 'pointsforreplyrec'); and (5) each time the originator's posting was rated (3 points * rating value, labelled 'pointsforraterec'), whereby the ratings ranged from 1 (very poor) to 5 (very good).

A simple interrupted time series with removal design [26] was applied with (active and passive) participation as the independent variable. The main

research aim of this experiment was to measure the hypothesized increase in active participation, but we also monitored data on passive participation. Both types of participation contribute to the collective behavior of the Learning Network, and were considered worthwhile to be studied. Although both types of participation increased significantly after introducing the reward system, in this paper we will restrict ourselves to data on active participation.

Table 1.
Total active participation points for each period (A-C) and parameter, for all participants (n=125)

Points X Period	Total points	points forpost	points forreply	points forrate	points forreplyrec	points forraterc
A.	117	60	20	3	10	24
B.	566	220	120	42	100	84
C.	141	40	30	12	35	24
A-C.	824	320	170	57	145	132

Table 1 shows that most active participation points were earned by making postings to forums (320 points in total, with 220 of these being in period B). Over time, the total amount of active participation points was divided as follows: 117 points in period A, 566 points in period B, and 141 points in period C. The average total points for active participation earned by active participants ($n = 17$) is 48.47 and by all participants ($n = 125$) it is 6.6. The repeated measures ANOVA, using time of measurement for the three periods as a within-subjects factor, reveals that 'period' indeed is a very significant factor in explaining the average total amount of points ($F(2, 122) = 14.17$, $MSE = 24,966.08$, $p < .001$, $\eta_p^2 = .104$), even with the majority of participants not actively contributing. Obviously, when we include 'scoring' (either 'those who did not score' or 'those who did score') as a between-subjects factor, (period * scoring) appears to be an even more significant factor ($F(2, 122) = 31.21$, $MSE = 24,966.08$, $p < .001$, $\eta_p^2 = .204$) in the linear model.

4. Face-to-face meetings

The potential of teamwork or other types of face-to-face collaboration for learning has been demonstrated by various studies in a variety of domains [27, 28, 29], and for Computer-Supported Collaborative Learning (CSCL) environments [30, 31]. The interaction between learners in CSCL can lead to further

elaboration and refinement of individually constructed schemas, since it incites learners to explicate the actual level of schema development and demands them to explicitly compare their own schemas with schemas of others as to defend or criticise [27].

Since July 2004, LN4LD had been maintained in the context of the 6th framework UNFOLD project for the dissemination of IMS-LD. The initial LN4LD implementation had been adapted for use as the COP (Community of Practice) for learning designers (www.moodle.learningnetworks.org). In addition to the provision of virtual COPs for various potential users of LD, UNFOLD organized a number of face-to-face meetings, especially during the five months from January to June 2005. In this period, three meetings were held by UNFOLD in February (Valkenburg, The Netherlands), in April (Barcelona, Spain) and in June (Braga, Portugal) with an averaged attendance of 70 people. Also, some meetings in parallel with congresses organized by others took place in Paris, Sheffield and Madrid. The promotion of these events was instigated from the UNFOLD and LN4LD portals for registered users. Although not designed for experimentation, this period provided us an opportunity to monitor the influence of additional face-to-face meetings on participation data in the LN.

For this purpose we logged all activities, not differentiating between active and passive participation. Data analysis shows the increase of participation from January-March 2005 to be 48% of participation between March -June 2005. Participation went from 3,750 actions till January to 17,553 actions in March and to 26,028 actions in June, meaning an increase of 8,475 actions from March and 22,278 actions from January.

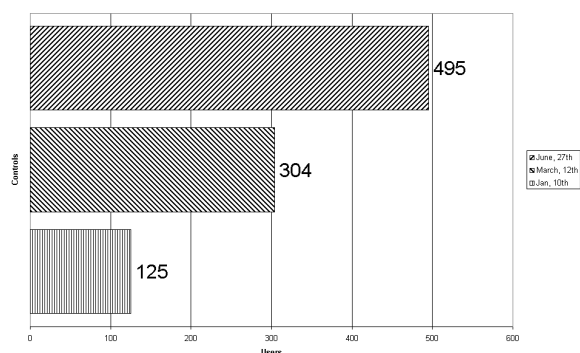


Figure 2. Growth of registered users (January, March, June 2005)

Concerning the amount of registered users, Figure 2 shows progress from 125 members in January to 304 in

March and 495 in June. This means an increase of a 243% in March and a cumulative one of a 396% in June. All these figures show a continuous, gradual increase of percentages and raw numbers on both, actions taken and registered users during this last period of study.

5. Conclusions and future research

We presented some preliminary data on participation while setting up initial pilot implementations of a learning network, and described the set-up and results from two studies that monitored active participation by adding an incentive mechanism and meetings respectively.

From the initial implementations we concluded that usability, simple structure, and clear policies are necessary requirements. Specifically, we found that users should not be overburdened by complex structures and too many facilities. We also concluded that additional policies would be needed for effective exchange and active contributions.

Introducing an incentive mechanism in line with the general purposes of the learning network indeed appeared to increase the level of participation (both active and passive) significantly. Interlacing virtual activities with additional face-to-face meetings on the same topics yielded another substantial increase in both activity level and amount of users registering. Adding rewards and meetings can therefore be considered as worthwhile 'add-ons' to virtual learning networks.

Although these are promising findings about *what* happened, we did not explain what caused these changes in behavior (*why* it happened). Future research will therefore have to find out about actual drivers for people to register and actively participate in learning networks. More qualitative analysis of logged data (e.g., by using diary methods) or additional interview techniques to analyze personal motivations might be fruitful for this work.

Other limitations are related to the relatively small group size of the community, and to the absence of any form of certification. Similar results might not materialize for students entering more formal or larger communities. Therefore, replications of these findings on a larger scale and for various forms of learning, incentives and topics are needed.

6. References

[1] Aspin, D. N., & Chapman, J. D. (2000). Lifelong learning: concepts and conceptions. *International Journal of Lifelong Education*, 19(1), 2-19.

- [2] Field, J. (2001). Lifelong education. *International Journal of Lifelong Education*, 20(1/2), 3-15.
- [3] Fischer, G., & Ostwald, J. (2002). Transcending the Information Given: Designing Learning Environments for Informed Participation. Paper presented at the Proceedings of ICCE 2002 International Conference on Computers in Education, Auckland, New Zealand.
- [4] Olsen, M. (1965). *The logic of collective action*. Cambridge, MA: Harvard University Press.
- [5] Smith, R. G., & Farquhar, A. (2000). The road ahead for knowledge management. *AI Magazine* 21(4), 17-40.
- [6] Prusak, L. (1999). What's up with knowledge management: a personal view. In J. Cortada & J. Woods (Eds.). *The knowledge management yearbook* (pp. 1-7). Boston: Butterworth Heinemann.
- [7] Boisot, M., & Griffiths, D. (1999). Possession is nine tenths of the law: managing a firm's knowledge base in a regime of weak appropriability. *International Journal of Technology Management*, 17(6), 662-676.
- [8] Koper, E.J.R., Hermans, H., Vogten, H., & Brouns, F.M.R. (2000). EML 1.0. [Retrieved online on December 12th, 2004, from <http://hdl.handle.net/1820/81>]
- [9] VBulletin. (2004). VBulletin. [Retrieved online on December 12th, 2004, from <http://www.vbulletin.com>]
- [10] IMS-LD (2003). IMS Learning Design Specification. [Retrieved online on February 27th, 2004, from <http://www.ims-global.org/learningdesign/index.cfm>]
- [11] PHP-Nuke. (2004). PHP-Nuke 4. [Retrieved online on December 12th, 2004, from <http://www.phpnuke.org>]
- [12] Dougiamas, M. (2004). Moodle. [Retrieved online on December 12th, 2004, from <http://moodle.org>]
- [13] Mevarech, Z.R., & Kramarski, B. (2003). The Effects of Metacognitive Training versus Worked-out Examples on Students' Mathematical Reasoning. *British Journal of Educational Psychology*, 73, 449-471.
- [14] Wiley, D.A., & Edwards, E.K. (2003). Online Self-Organizing Social Systems: The Decentralized Future of Online Learning. [Retrieved online on March 12, 2004 from: <http://wiley.ed.usu.edu/docs/ososs.pdf>]
- [15] Nelson, L.M. (1999). Collaborative Problem Solving. In C.M. Reigeluth (Ed.). *Instructional Design Theories and Models: A new Paradigm of Instructional Theory* (pp. 241-267). Hillsdale, NJ: Lawrence Erlbaum Associates.
- [16] De Paula, R., Fischer, G., & Ostwald, J. (2001). Courses as seeds: expectations and realities. Paper presented at the European CSCL 2001, Maastricht, The Netherlands.
- [17] De Paula, R. (2003). Active Learning Networks : Designing for Computer Supported Social Networks in Special Education Environments. Paper presented at the ECSCW'03 Workshop on Social Networks, 14-18 September, 2003, Helsinki, Finland. [Retrieved online on Oct 16, 2003, from: <http://www.ischool.washington.edu/mcdonald/ecscw03/papers/depaula-ecscw03-ws.pdf>]
- [18] Hummel, H.G.K., Tattersall, C., Burgos, D., Brouns, F.M.R., Kurvers, H.J., Koper, E.J.R. (2005). Facilitating participation: From the EML web site to the Learning Network for Learning Design. *Interactive Learning Environments*, 13(1/2), 55-69.
- [19] Thibaut, J., & Kelly, H. (1959) *The social psychology of groups*. New York: Wiley.

- [20] Constant, D., Kiesler, S., & Sproull, L. (1994). What is mine is ours, or is it? *Information Systems Research*, 5(4), 400-422.
- [21] Deci, E.L. (1975). *Intrinsic motivation*. New York: Plenum Press.
- [22] Deci, E.L., & Ryan, R.M. (1985). *Intrinsic motivation and Self-Determination in Human Behavior*. New York: Plenum Press.
- [23] Hall, H. (2001). Social exchanges for knowledge exchange. *Paper presented at Managing knowledge: conversations and critiques*, 10-11 April 2001. University of Leicester Management Centre.
- [24] Sawyer, S., Eschenfelder, K., & Hexkman, R. (2000). Knowledge markets: cooperation among distributed technical specialists. In T. Srikantiah & M. Koenig (Eds.). *Knowledge management for the information professional* (pp. 181-204). Medford, NJ: Information Today.
- [25] Hummel, H.G.K, Burgos, D., Tattersall, C., Brouns, F.M.R., Kurvers, H.J., Koper, E.J.R. (2005). Encouraging contributions in learning networks using incentive mechanisms. *Journal of Computer Assisted Learning*, 21(5), 355-365.
- [26] (Robson, C. (2003). *Real world research: A Resource for Social Scientists and Practitioner-researchers (Regional Surveys of the World)*. Blackwell Publishers
- [27] Barlow, C, Phelan, A., Harasym, P, & Myrick, F. (2004). Peer Collaboration as a Model for Workplace Learning in Health care: Possibilities and Challenges. [Retrieved online on November 23, 2004 from: <http://www.wln.ualberta.ca/papers/pdf/03.pdf>]
- [28] Pawar, K.S., & Sharifi, S. (1997) Physical or Virtual Team Collocation: Does it matter? *International Journal of Production Economics*, 52(3), 283-290.
- [29] Pearce, J. A. I., & Ravlin, E. C. (1987). The Design and Activation of Self Regulating Work groups. *Human Relations*, 40(11), 751-760.
- [30] Gunawardena, C.N., Carabjal, K., & Lowe, C.A. (2001). Critical Analysis of Models and Methods used to evaluate Online Learning Networks. Seattle: AERA.
- [31] Gunawardena, C.N., Lowe, C.A. & Anderson, T (1997). Analysis of a Global Online Debate and the Development of an Interaction Analysis Model for Examining Social Construction of Knowledge in Computer Conferencing. *Journal of Educational Computing Research*, 17(4), 395-429.
- [32] Jeong, H., & Chi, M.T.H. (2000). Does Collaborative Learning Lead to the Construction of Common Knowledge? [Retrieved online on July 9, 2004 from: http://www.ircs.upenn.edu.edu/cogsci2000/PRCDNGS/SPRCDNGS/posters/jeo_chi.pdf]

7. Author note

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