

Technology-Embraced Informal-*in*-Formal-Learning

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Abstract. Informal learning takes usually place outside of a formal task given by a teacher. A characteristic is that a person has an unsolved issue and starts searching for answers. To what extent can we transfer such a 'motivation to learn' into formal education? In 2002, an online, open and free, forum at a university has been launched for around 2,000 students at a computer science study program (CS). Users got the opportunity to co-construct new knowledge about issues what they want like content of courses, open issues or self-organization. Designed in that way, the online forum provides an informal learning space. What kinds of informal learning activities take place? Studying the forum from a role-based approach, one conclusion is that the iForum activates the conative level of learning. The term conation by Kolbe in 1990 refers to a concrete action; the learner does not only know but s/he really acts, s/he is willing, s/he is doing to do. This aspect of learning is often neglected in formal schooling where cognitive learning "learning what" and "textbook knowledge" is more focused. With an iForum the conation of learners can be partly re-activated.

Keywords. Computer support, Conative learning, Online Forum

1 Flexible learning

Modern day learning systems are more flexible, adaptable to different existing levels of knowledge and learning strategies, but are usually controlled by the teacher as well. They often do not implement concepts that embed the whole learning process into the given curriculum and empower the students to manage their own learning. To fill that gap, the terms "flexible learning" and "informal learning" are currently re-discussed concepts in teaching and learning. These approaches aim to support the learning progress of an individual by giving the learner different options to take a learning opportunity such as 'learning what', 'learning how', 'learning when', 'learning where' and 'learning with whom'. The learners have the freedom of access to content, location (virtual, physically), people, time and pace. This is also called 'anytime, anywhere' access. "Flexibility means anticipating, and responding to the ever-changing needs and expectations of (...) learners" [25].

Informal learning usually takes place when a learner has unsolved issues outside of a formal instruction given by a teacher. Sometimes these informal unsolved issues are

clear problems and conscious to an individual; sometimes they are less clear and less obvious. Imagine, a person who wants to know something and starts searching for an answer. Such ‘unsolved problems’ are, for instance, improving a swim style by watching YouTube videos, checking if the information is correctly, observe how a speaker reacts to difficult questions and so forth. Currently, we also see a change in discussion cultures of daily-life groups: when facts are discussed at least one person takes her smartphone and ‘googles’ the information – unplanned learning takes place.

Informal learning can lead to a deeper understanding and a different quality of a learning outcome; it enables the learner to expand her thinking beyond receptive behavior at formal schooling and beyond traditional reproduction of existing knowledge. A combination of both informal learning added to formal education might be a win-win situation for learners. The research question is: To what extent is flexible, informal learning in formal learning useful? Does it make sense to foster informal learning in formal schooling, if yes, for what purposes is it meaningful?

To answer this question, an online forum at a computer science study program at a university has been analyzed. The forum provides a communication space where students and other faculty members share and co-construct new knowledge. Since results from a former project showed that there is a gap between planning (thinking) *and* practice (doing) of a self-organized study from the perspective of the students [17], the objective of the open system was focused on student’s issues like how to scaffold the learning progress, what to do to gain qualifications and to discuss content of the study program. While integrating an online forum, the designers wanted to offer new ways of communication among members of the faculty. Derived questions are: What do the students do within the open, free, online forum; what kind of information do they share? How often are they active and what are reasons that they are active?

The research objective is to deepen the knowledge about student’s behavior in an online forum that represents Technology-Enhanced informal learning, to hear their voices, to understand their motivations, their expectations, if and to what extent such an informal learning environment is helpful for them and their studies.

2 Linking informal and formal learning

In the past few years, new forms of learning have emerged. John S. Brown makes it clear [3]: “Whatever your particular interest is, there is some niche community, already formed on the network you can join. (...) These resources not only provide facts. They are also tools you can use to build things to tinker with, to play with, to reflect on, and to share with others. And most importantly, you will learn from other people’s comments and from what they do with your creations.” (p. X). Because complex societies need teams of workers, collaboration is one important aspect in learning today [26]. It is not possible anymore to collaborate efficiently without having social media (e.g., how easy it is to share information online).

With regard to the specific domain of higher education, Collins and Halverson [5], both are professors of education, wrote their book about “rethinking education in the age of technology”. They illustrate that the pressure to rethink the formal education

today is increasing more than ever because the innovation is coming from outside of the schools into the classrooms (p. 127). We currently do not know if formal schooling will be replaced or not, but new forms of both formal and informal learning will emerge around the edge of formal schooling [3]. Social media affects the relationship between formal schooling, informal learning out of the school and collaborative learning at the workplace [10]. These studies illustrate a transformation in education through innovation in mobile computing [27]. Fischer [9] stresses such new forms of lifelong learning as “cultures of participation”.

2.1 Informal, non-formal, formal learning

Informal learning can be described by the concepts of “experiential learning” by Kolb [18] and “incidental learning” [23]. According to David Kolb’s experiential learning cycle, learning takes place in four steps; a learner has a) a concrete experience, b) she observe and reflects, c) she draws conclusion and forms abstract concepts, and d) she tests those new concepts in new situations. According to Schön [24], a person is doing these four steps by contrasting her experiences with the experiences of others [6].

Sometimes, these forms are unplanned learning situations that also occur in formal or non-formal learning situations. Formal, non-formal and informal learning differs in a) the degree of organization b) formal certificates, credits or a degree and b) the criterion of ‘who triggers learning’ [1].

- Formal learning is triggered by an instructor or teacher, organized by such a person or educational institution, the learner get credits or a formal degree;
- Non-formal learning is also a form of planned learning, and structured with regard to learning objectives, time, support; it is organized by an external person, but it usually takes place outside of educational institutions (e.g. community programs);
- informal learning is a self-directed learning situation, or not-organized at all, triggered by the learner instead by an external teacher, no degree included.

The problem with these concepts is that it is difficult to differ because of crossovers; in literature also exist contradictory definitions. A main difference between the different learning forms is the external organizer. Formal and non-formal learning is related to a teacher and tutor, who give instructions and rules; informal learning is related to an inspiring environment and supporting structures (translated by authors; [7], p. 19). Watkins and Marsick [29] describe advanced characteristics and say that important factors for informal learning are the quality of the activity and the reflection of the learner. Especially, supporting structures from the environment are essential, e.g., feedback by different people.

2.2 Online groups, online forums

Online groups in social media platforms and social networking sites illustrate examples of informal self-directed learning situations much better than in Web 1.0. Online

forums, blogs with comments by readers, Facebook and LinkedIn groups are just few examples where informal learning can take place.

Online groups have been studied by many research teams, to name few, Preece and her colleagues [20], and Wellman et al. [30]. According to their studies those groups differ in four areas [20]: a) Group size (e.g., groups with 25 members or less to groups with 1,000 or more), b) primary content (e.g., discussion boards about stock exchange, marathon training, or courses at universities), c) lifespan (e.g., several years or only for organizing one event), and d) the degree of presence (e.g., online communication, face-to-face communication or mixed). In addition, online forums and discussion boards have specific properties (adapted by [2]; [28]) such as:

- The communication form is mostly online and asynchronously.
- The degree of participation, a core group contributes regularly.
- The degree of membership; a core group, more peripheral users, less lurkers.
- The technology serves as communication support system.
- There is a “private identity” and “public accessibility”.

The “private identity” means that the users in such forums often have anonymous nicknames and keep their identity in private whereas the information, they share, is public. The content often has a public access for all – for people with Internet access.

3 A longitudinal study – context, mixed methods

The project ‘Knowledge management within Universities’ [15] revealed many information deficiencies in particular from the students’ perspective [17]. The project concluded that students, who are enrolled in study programs where they have to self-organize their studies, had a lack of knowledge and lack of skills. This lack is, for example, how to choose which lecture, in which semester, how to plan and manage self-organized learning, how to manage the study program to complete successfully, to gain qualifications and passing exams. To solve this lack of skills, a learning management system (LMS) has been launched in 2002.

In addition to the LMS, a free and open, online forum was offered in order to support students to develop those skills they need to complete their degree. The forum was introduced to overcome the lack of student’s knowledge about self-organization. The forum serves as an informal learning approach in which learning has been defined as the co-construction of knowledge ([26], [8]) among new students, traditional students, senior students, study advisors as well as faculty members (e.g., teachers, dean officers, administration officers).

The online forum covers two fields. There are sub-forums for supporting learning in the fields of a) formal education like courses, lectures, seminars and b) the study program of computer science (CS) in detail, planning and organizing the CS study for a degree. The forum is called “iForum”. The project was part of a design research study (e.g., [22]). The data collection, analysis, evaluation and redesign were conducted in iterative cycles of research and development from 2002 to 2009. The data

gathering included a mixed method like open-ended interviews, standardized questionnaires, user statistics, content analysis and log-files.

3.1 The expanded role theory as a framework for studying the iForum

Our theoretical underpinning is the expansion of the role theory in sociotechnical systems; read [11] where we describe the term “role” and its long tradition in detail. To make it short here, the two paradigms "symbolic interaction" (starting with Mead 1934) and the "functionalistic perspective" (starting with Linton 1936), elaborated by many others to the mid of the 1990s, attempt to explain the relationship between the individual and society, between a person and the system. The functionalistic approach suggests the existence of objective structures that determine the individuals' behavior. In contrast, the symbolic interaction approach emphasizes that roles are formed more on the subjective will by actors. Both influence each other ([11], [16], [14]).

Fig 1. Social actors <-> Situated in Roles <-> On-/Offline system/network

An advantage from that theory is that this view on roles is helpful to explore structures of group interactions within sociotechnical systems - the actors, the group and the system/network are parts of that theory. The advancing of the role theory explains the co-construction of knowledge by social actors situated in roles in off- or online systems; the role serves as a interactive mediator between the human actors and the social system/network (fig. 1). Following our prior work [11], a role consists of

- a formal position within a system (online community, online network/group)
- a formal function and tasks related to that position
- explicit and implicit behavior expectations of different people towards positions
- role-playing by actors (e.g., same role different role-playings by different actors)

A role is not a static phenomenon; it is rather a social-constructed formal-informal negotiation of actors and systems influencing each other based on a historical body. We call this phenomenon as the duality of dynamical structures of roles and role-mechanism [11].

3.2 Mixed methods

For this paper, we focus on the analysis of log files and content analysis in addition to online questionnaires a) in 2002 (pre-survey) and b) 6 years later (in 2008/9, post-survey). The questionnaire of the post-survey was online between December 2008 and January 2009. This quantitative survey did include 24 standardized as well as open-ended questions. The questionnaire was available four weeks online and 345 questionnaires returned. This is response rate of around 20 percent of all enrolled students (around 2,000). The quantitative data have been analyzed with SPSS version 7. Table 1 shows the elements of the role theory, how it has been operationalized in the iForum connected to different forms of data collections.

Table 1. Expanded role theory & data collection

| Role Theory elements | iForum (operationalized) | Data collection |
|--|--|-----------------------------|
| position in the iForum | What kinds of members (self-perception)? | Questionnaire |
| function/tasks related to the position | How often do different kind of members contribute (self-perception)? | Questionnaire |
| behavior expectations | What do the members expect towards the 'doing' of the others? | Open ended questionnaire |
| role-playing | What do the members really do? | Log files; content analysis |

4 Description of the open, free, online iForum

The iForum is a PHP based technical system. To read the content the users need only an Internet access. Everyone can read everything. To post contributions a registration and login is required. The registration does not require the real name; the users can select a free username. Furthermore a valid email address is necessary, however, the email addresses are not shown except to the software administrators. The online forum supports a public communication based on the anonymity of its users. This is different to traditional LMS in higher education, which often require registration given by the university administration desk and the real name of the users. In 2008, the iForum had more than 30 sub-boards, each with their own moderators. The sub-boards exist for both a) courses like lectures and seminars (e.g., to discuss exercises or content of lectures) and b) study organization, for example, 'where to register for examinations', 'where to find the university calendar (timetable)', etc.

What do the students do online? The decision about the topics mainly depends on what the students want to discuss. The iForum is a) characterized by a large size (1,500 users), b) users share knowledge about the CS degree, information about 'how to manage a study for a degree', c) it has an extend lifespan, started in 2002 and still exists today d) the board provides a space for online communication. The board is embedded in an information website that includes facts about courses. The communication space in the iForum is online and usually asynchronously. The forum serves as communication support system. It provides private identity (login is possible with nicknames, email addresses are not shown) but enables public accessibility.

5 Results

5.1 Positions and functions in the iForum: self perception & the other reality

Since iForum's launch in 2002, the number of users has increased steadily. This was a surprise since there were no marketing or any external advertising. In December 2008, around 1,500 individuals had an account. This represents around 75% of the 2,000 students enrolled at CS (Dec/2008).

62% of the respondents label themselves as regular members, 30% as newbies, 8% said they are experienced members. These formal positions have been expected. In

such online groups the active contributors and the core group are usually the smaller group than the readers and lurkers ([20], [31]).

What the students really do

According to the log files, 1,166 members contributed *actively*. A core of about 270 individuals (18%) provided contributions often and regularly. Other active members made fewer postings. These members can be described as the peripheral members (60%). Around 300 members were registered but didn't post (22%, registered lurking). A total of almost 1,500 members have been registered. Interesting is also the fact that there is a *second level* of lurkers, those who are not registered in the iForum, about 500 of 2,000 students, approximately a quarter.

What the members say and what they really do is more or less the same – except that the core group and registered lurkers differ in around 8-10 percent (see table 2).

Table 2. What the users say *and* what they do

| iForum | What the users <i>say</i> (questionnaire) n=345 | What the users <i>do</i> (logfiles) n=1,478 |
|------------------------------|--|--|
| Core group | 8 | 18 |
| Registered lurking (Newbies) | 30 | 22 |
| Regular/peripheral members | 62 | 60 |
| | 100 percent | 100 percent |

To the question “Do you label yourself as a community-member?” more than 70 percent of the students agreed (n=188). This is a little surprise since it means that not only the core members but also the active and peripheral members rate themselves as part of the iForum.

The questionnaire also asked about *how often* the students (A) *read* and (B) *post*; this is what we name functions or task in this context. Especially the reading was of our interest because this was not logged via the technical system. Ad A). Reading ranged from “very often” to “seldom” (Likert-Scale, 1 to 5). Almost 75% *read* often per week and only 25% said they read less (once per month or less). Ad B) In contrast, only one-third of the respondents say they *write/contribute* once a week or often, and the majority of 70% *write* only once per month or less. These data confirms the typical expected positions and functions of members in online groups.

First implication.

The majority of the users feels associated to the iForum and feels they belong to this community of interests (70 percent of the respondents) although the real core group (19%) and active contributions (once a week or more often, ca. 30%) is less. This is a surprising result.

The frequency of making active contributions (core group, 19 percent) and the perception of being a community member (70 percent), from a user's point of view, is unequally distributed. Hence, the statement that only the strong active users perceive themselves as community members is not valid. The question is, why do the other

users also perceive themselves as being part of the community? When it is not the criteria of ‘frequency of contributing’, which makes a user to a community member, what else might it be?

An answer might be that those users who are *active readers* feel also like a community member. This is supported by the results in table 2. Users said, “my questions are already there”. So, what these users in the forum usually do is that they are active but without coming explicitly into the community picture; they are active but do not appear as active explicitly. Such active readers are people who

- search for answers first, before they post a new question,
- re-construct actively the talks and discussion which are already online (and this is not always easy in a huge online forum where much information is available),
- acquire/construct knowledge only for themselves; communicate in other communities outside of the iForum.

The question is what does this mean for in-/formal learning supported by technologies? One answer is that in-/formal learning should be not reduced to an active learning approach that understands ‘active’ just as ‘active posting or writing’. Active learning also takes place in active reading, which includes reflections on available questions and answers of others. Active reading also means that the reader re-construct the dialogs within the forum. In these dialogs, like a movie scene, the active reader is an observer and learns from observing and reflecting the discussion of others with regard to her/his individual problem s/he wants to solve. Such users are active but they are not visible for the group.

5.2 Categories of learning activities – behavior expectations

Beside the question, how often the students contribute, the research question was, what do they expect towards the ‘doing’ of the others? What information do the students share, for what kind of learning activity is such an iForum helpful?

Student’s expectations towards unsolved issues within a self-organized study.

The students expect that the other members of the iForum help to get news from the faculty (70 percent) and to get news from the CS study program (88 percent).

In detail, the members expect that the others help to find solutions for the following two items (Likert-Scale; 1=strongly agree; 5= strongly disagree): (A) “when to attend what courses?” (Mean=2.2) and (B) “how to get in contact with other students?” (M=2.2). The students assess both items with good and very good, and assign them a high degree of importance. In contrast, the iForum is not as useful as expected in five areas (M=2.6 to M=3.1):

- (a) “how to combine lectures, tutorials, practical courses?”,
- (b) “who is responsible for what in the faculty/department?”,
- (c) “how & when to prepare for examinations?”,
- (d) “how important is a lecture for my/student’s studies?”,

- (e) “when to expect some problems during my/student’s degree?”.

Interesting here is that the students have expected that the others help in those 5 issues; but while online and using the iForum the members said that their expectations have not met. Furthermore, that is a surprise, the students do not expect to get a support regarding 3 items: (1) “how many hours a student might need to complete the degree?”, (2) “what skills could be essential to successfully finish the degree?”, and (3) “what skills should a student have learnt by the time s/he gets the degree?”. There is only a little expectation of the members to get answers to those three issues.

Behavior expectations towards contribution and participation.

The different motivations, why the members the online forum use, were analyzed in detail. More than 71 percent of the respondents wrote that they use the iForum “*to ask subject-specific questions about courses*”. They do this often, once a week and more than once week. Around two-thirds of the students use the forum as follows:

- sharing information about lectures and tutorials.
- solving exercises online collaboratively,
- learning to handle different opinions.

More than 50 percent of the members use the iForum for preparing for examinations, exchanging knowledge and information with others, helping others and asking organizational issues regarding study management and courses. Around 40 percent use the online board for communicating with teachers, getting in contact with other people or firms and enterprises (possible future employers).

Non-active contributors (registered lurkers).

More than 300 registered members did not contribute but where registered (contribution=0). These registered iForum-lurkers are about 15% of all 2,000 students.

According to Preece et al. ([20]), there are various reasons for why users do not post (e.g., no motivation, curiosity). To understand the reasons for non-contribution, we had an open question that 113 students answered (coded afterwards). We expected that a) the registered lurkers want to show their interest in the community although they do not actively participate, and b) they are waiting for the right moment to post. But the survey collected additionally different motivations, why iForum-users have an account but do not actively contribute. The most important factor for non-active contributing is that questions, the members have, are already online (32 percent, see table 3). The detailed motivations are named in table 3.

Table 3. Motivation for lurking and reading only

| Motivations of non-active contributors in iForum (open question, coded) | % (n=113) |
|--|------------------|
| “Questions, I have, already there in the iForum”; “answers already available” (F1) | 31.8 |
| Communication problems/weakness: “difficulties with language”, “shy”, “I’m afraid of asking sth.”, “I do not want to ask stupid/dumb questions” (F2) | 16.8 |

| | |
|---|------|
| Forum as information source: “an account has the advantages to get information what happens in which sub boards”; “automatic notification via email” (F3) | 15.9 |
| No motivation: “no interests”, “I’m too lazy”, “I have no time” (F4) | 15.4 |
| Questions can be clarified on other ways: “Face-to-face is better”; different contact points available; no need for information online, “I see no necessity” (F5) | 12.4 |
| “No special topics available where I can say something” (F6) | 8.0 |

Have the expectations met? User’s satisfaction.

As seen above, one result is that users expect to use the online forum in different ways. The question is: to what extent are the students satisfied with such an informal learning opportunity? The users’ satisfaction is more or less high. The learners would miss the online board if it were not there. 70% (n=188) say that the online board is an appropriate support for getting information about the CS study program. Almost all students recommend the iForum (94 percent; n=161). More than 92 percent (n=145) assess the iForum with “very good”. Only 8 percent of the respondents do not like it.

Is such an open, free, online forum useful?

More than two-thirds of the respondents expect that the other members help when a person gets stuck and is not able to progress (“useful”, 92 percent). The iForum has a good access (80 percent) and is clearly structured (more than 66% agree). However, there are also problems since information is not so easy to find (a mean of 2.44; scale 1-5), and the information in iForum is not complete [only 39 percent agree, almost 40 percent say ‘partially’, 21 percent disagree; mean=2.8], see table 4.

Table 4. The iForum is seen as useful although information is not complete

| The iForum is... | Strongly agree (1) | Agree (2) | Partially (3) | Disagree (4) | Strongly disagree (5) |
|--|--------------------|-------------|---------------|--------------|-----------------------|
| ...useful for my studies (n=313, σ =1.4) | 69.3 | 23.0 | 5.8 | 0.6 | 1.3 |
| ...good accessible (n=308, σ = 1.60) | 57.5 | 29.9 | 8.8 | 2.6 | 1.3 |
| ...clearly structured (n=308, σ = 2.1) | 26.3 | 41.6 | 24.7 | 5.2 | 2.3 |
| Information easy to find (n=306, σ = 2.4) | 16.3 | 39.5 | 30.7 | 10.8 | 2.6 |
| ...complete (n=298, σ = 2.80) | 10.7 | 27.9 | 38.9 | 15.8 | 6.7 |

Second implication.

Although the information is not complete the students say that the communication to the others, which constitute the online forum, is useful (94% recommendation, 92% useful). One explanation might be that most of the users get a quick answer when they have unsolved problems. The data indicates that almost all open questions have at least one answer. There are only few postings without any response.

5.3 Different forms of role-playing

An open question asked about the role-playing of iForum-users, why they actively participate, and why they contribute online. Most of the answers are “*I ask uncleared and unsolved questions*”, and “*I need answers or solutions*”. Some interviewees also

mentioned that they like to help other students: *“I help other students since I hope they will help me later, when I need help”*, *“That’s the sense of a community, we help each other”*, and *“Only active members affect active, vivid forums”*.

Other interviewees did like the opportunity to get in contact with others at unusual time slots, *“direct contact possibilities at unusual time in the night”*, and stress the anonymity: *“because of the anonymity, I can ask ‘stupid’ questions”*.

Until so far, we expected such results. But during the data analysis two new aspects for being online and active contributions came up. These are (1) criticizing deficiencies and (2) gaining attention out of huge groups in higher education; in more detail:

Ad 1) Students use the iForum to criticize shortcomings within the faculty, which is responsible for the CS study program. The respondents said: *“I want to show my opinion”*, *“I can show my anger by using anonymity”*, *„I can scarify deficiencies”*, and *“When I’m annoyed about something or somebody, I can say it in the forum”*.

Ad 2) The users use the forum to get out from the huge group of learners. Students perceive those large groups as ‘anonymous mass’. So, when writing something in iForum, they want to show their individual faces and voices, and try to gain attention: *“I post because I have to say something”*, and *“Sometimes, I even want to say something”*. Some users stressed especially the factor of awareness: *“I think the professor will be better aware of me when I’m active in the iForum. So, I’m not just a pure number for him but become an individual”*.

The interesting result here is that anonymity has a double contrary function, which could be revealed through applying the role-based research approach. Because of the anonymity, some students use the forum to show their anger or to reveal aspects they do not agree with. In case it would be not anonymous, students expect negative sanctions or difficulties (e.g., bad grade). On the other hand, some other members use the iForum to gain more attention and getting out of the anonymity of large groups by saying something and by creating a voice. By participating online, some members expect that other people would perceive their individual voices better than usual and better than without the iForum. Additional data supports this. Almost 55 percent (n=133) agreed *“the iForum (digital life) has a positive impact on my offline life”*.

Third implication.

With regard to such a differentiated picture of role-playing, the question is, what do these results mean for in-/formal learning? Following the results of ‘anonymity’, one implication is that learning needs a special space, a space where the students can be free, where they can experiment and can act creative without any fear to get bad reprisals (like a bad grade or other difficulties). Learners need a space where they can show their opinion (“anger”) when they perceive shortcomings or deficiencies of the formal education. They want to say something, possibly with the intention to change something in their environment or with the thinking that they are not able to change the real circumstances but at least want to mention the situation.

A further implication is that the online forum promotes a special membership feeling that increases the motivation to learn. This feeling is expressed in terms like *“That’s the sense of a community, we help each other”* (interviewees). It seems that the group feeling within the forum activates a) the user’s perception of having a spe-

cific form of social proximity triggered by technology and b) activates the conative level of learning. The term “conation” refers to a concrete action conducted by a learner; s/he is not only knowing but s/he really acts, s/he is willing, s/he is doing to do sth. ([19], [21]). This level of learning is often neglected in formal schooling where the cognitive learning “learning what” and “textbook knowledge learning” is often focused without supporting the learners to practice this in action. Textbook learning neglects the criteria of situated learning (Lave & Wenger, 1991).

6 Design issues for informal-*in*-formal learning

What do those findings mean for informal learning supported by technologies integrated into formal learning like higher education? Because of the results about the online forum such as the long lifespan (today more than 10 years), the high numbers of participants (around 1,500), who are satisfied (94%, section 5.3), the positive membership feelings (section 5.1), and the range of different learning activities (section 5.2), the answer is simple: Informal learning enriches the traditional formal learning approaches through integrating interactive media; this fosters a positive learning experience for learners. To design such an experience, considering following criteria:

(1) Do not reduce informal learning to an active learning approach that understands ‘active’ just as ‘active posting or writing’. Active learning also takes place in ‘active reading’, which includes reflective observation of dialogs by others. Such users are active but not visible for the group. The question for designers is, how can we make those active readers visible? Studies on designing “awareness” are one possible answer (e.g., overview [12]) but often do focus on active contributors and neglect those people who are active readers who are not visible.

(2) When informal learning is a part of formal schooling, then it needs a specific online space where learners can experiment and can act creative without any fear to get reprisals. Instead of supporting traditional learning management systems or Social media like Facebook when the users show their real name, an anonymous space seems to be needed to foster *honest* communication.

(3) In informal learning environments, the dynamic of the users are in the center of the learning progress. Not the information itself is up-to-date but the access to a communication space and other members who can help. What would happen when more experts like teachers/instructors would be online, and active, would it be helpful or are there any contrary effects when they would participate? When experts would come to the stage, the process of co-construction of knowledge *by the learners* would be neglected, and then, learners would fall back in a receptive learning behavior, instead of staying active.

(4) The results about the iForum indicate a special feeling of a membership. It seems that the ‘group feeling’ within the forum *activates* the conative level of learning. A learner is willing to do something and really *does*. This concept also stresses what a learning outcome really is “a changed behavior of the learner” ([21]). This level of learning is often neglected in formal schooling where the cognitive learning “learning what” and “textbook knowledge” is focused without supporting the learners

to practice this in action, or to reflect practices. The iForum supports such a challenge-based learning ([13]).

7 Conclusion

With this study we wanted to find answers to the question, to what extent is informal learning supported by technologies useful in formal schooling? The study illustrated a differentiated picture of an informal learning environment (online forum) that has been added to the formal education (around 2,000 students at the department).

Although the study points out that some categories useful and others are not useful for informal learning enhanced by online boards, the study reveals the overall finding that an online board can foster informal learning over time. The implementation of a free, open, online forum supports the co-construction of new knowledge of students.

One explanation might be that such online forums foster the *customization* of learning by providing a choice of learning opportunities. Despite huge classes (here 2,000 students), me-centricity and individualization of the learners are supported very well by such an informal learning system. Students can ask and receive answers about what *they* want to discuss, and when they want, when they need. Another explanation is the flexibility of a “just-in-time-communication” ([14]). For the members, it is easier to get only such information they need at a specific time. The availability of web access from anywhere at any time to human communication make it easier to engage students in learning and knowledge sharing and can also link weakly coupled learners. From a role-based approach, the results indicate that members in the iForum are able to create different role-expectations but also different role-playing they need to complete the learning progress.

From that point of view, such an online forum is an appropriate platform to foster informal learning in higher education. Informal learning enriches the traditional formal learning approaches, by the use of interactive media that fosters a positive learning experience for learners. The addition of informal learning expands formal education and leads to an all-embracing learning experience that activate learners on all levels such as the cognitive, affective and on the conative level as well – this is what we call technology-embraced ‘informal-*in*-formal learning’.

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