A Four Dimensional Model of Formal and Informal Learning

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Abstract: Learning systems focused on collaborative learning are often described in terms of formal and informal learning, however definitions of formal and informal learning vary, which makes it difficult to compare systems that may have been described using different perspectives. In this paper we present a framework for describing formality in e-learning systems, which can account for the most common perspectives: formality focused on Learning Objective, Learning Environment, Learning Activity and/or Learning Tool. Our framework can be used to compare different e-learning systems, and can also describe collaborative systems where different students can take very different roles in the activity, and the degree of formality can vary according to the role.

Keywords: e-learning, informal systems

1. Introduction

Learning systems can be designed to support a variety of pedagogical methods and different learning styles (Kozma 1991). One of the most important distinctions is between formal and informal learning, formal learning is typically described as learning that is managed in some manner by an authority (for example, at School or at University), while informal learning is less managed, or may be managed by the learner themselves (Smith 1999; McGiveney 1999; Coombs and Ahmed 1974).

At present there is no absolute agreement on what differentiates formal from informal learning, for example, which aspects of the management of the learning experience should be considered, some experts look exclusively at the physical context (i.e. is learning happening in a classroom) (Ramey-Gassert 1997), while others look at who is in control of the curriculum (Scanlon et.al. 2005).

This presents a problem as it makes it difficult to compare different systems, as they may have been described as informal using different perspectives. In addition many collaborative systems involve participants using a variety of different roles (Arrigo, Giuseppe et al. 2007), and each role could be considered separately (for example, one student in the classroom may be experiencing a formal learning activity, while another in the field is experiencing an informal activity).

In this paper we present a model of informality that accommodates four different perspectives on what should or should not be managed in an experience to make it formal or informal. This allows us to place a system (or each role in a system) within a four-dimensional space, allowing us to compare systems in any one of the four dimensions.

This is useful as it helps place the different perspectives of formal and informal learning in the same framework, and it also allows us to begin to identify which of the four dimensions have the most coverage, and which have been less well explored. Our goal is to assess to what extent learning systems have embraced informality, and to give a framework within which future advances might be evaluated.

2. Background

Using e-learning systems, educators can manage and organise learning activities, and communicate and share learning resources with students. A variety of commercial e-learning systems are being adopted in many educational institutions such as WebCT and Blackboard.

However, with the swift advance of Information Technology, learning is no longer confined in a specific location; it could be 'beyond the classroom' which means that learning takes place anywhere at anytime (Ramey-Gassert 1997; Bentley 1998) and 'informal and incidental learning in the workplace' depicts that learning depends on the work context (Dale and Bell 1999) such as individual performance of job and employability.

In this paper, we put emphasis on exploring whether the design and implementation of learning environments tend to be in the spirit of formality or informality. Informal learning has a significant role in learning science (Ramey-Gassert 1997) and '*Informal learning should no longer be regarded as an inferior form of learning whose main purpose is to act as the precursor of formal learning*' (Coffield 2000). However many researchers have different perspectives of what makes a given learning activity formal or informal.

In general, learning includes a spectrum of formal learning, non-formal learning, and informal learning (Cook and Smith 2004), in terms of their characteristics of learning environment and context (Jeffs and Smith 1990). For example, if we regard environment as paramount we might say that formal learning happens within schools (Smith 1999) and informal learning happens outside the schools (McGiveney 1999; Coombs and Ahmed 1974).

Rather than environment we might regard the curriculum as the most important factor, for example, learning which is little related to a curriculum will be regarded non-formal learning (Vavoula 2004; Diamond 1999) '*In intentional formal learning, the goals and the process of learning are explicitly defined by a teacher or by an institution. In intentional, informal learning, the goals and the process are explicitly defined by the learner*' (Scanlon et.al. 2005)

Knowles (1975) also identified informal learning with self-directed learning, he broke the process down into five steps: 'To diagnose their learning needs, formulate learning goals, identify resources for learning, select and carry out learning strategies, and estimate learning outcomes'. Others believe that the self-direction extends to the learners broader environment or context (McGivney, 1999).

Other views that have been expressed include Wellington (1990) who claims that informal learning is student-led, student-centred and non-certificated as compared to formal learning, and emerges from the experiences of the learner, for example by practicing skills, and Eraut (2000) who links formal learning to accreditation and qualifications.

The difficulty with these existing models of formal and informal learning is that each comes from a different perspective, where they value certain types of informality more than others, for example learning direction over learning location. Thus what is informal to one model could be formal to another. What is needed is a framework for understanding how these perspectives relate to one another, to help solve this problem we present a 4D Model of Formal Learning, which explicitly considers a number of different dimensions.

3. 4D MODEL of formal learning

We have based our dimensions on typical "who, what, when, where, why, how" questions; as such we are considering the learning experience as a whole, rather than looking solely at the system. We have simplified the six questions down to four dimensions by considering Environment (Where and When) and Activity (What and Who) as two rather than four criteria. We have done this for two reasons: firstly, this is the level at which they are commonly described in the literature where *environment* and *activity* are well understood terms; secondly it simplifies the classification process and enables effective presentation of any results, making them easier to analyse. Our four dimensions are as follows:

- **Learning Objective** (the goal of the activity - *Why* is the student doing this activity?)
- **Learning Environment** (the place and time of the activity - *Where* is the learning activity happening and *When* is it happening?)
- **Learning Activity** (the activity itself - *What* is it that the student is going to actually do, and *Who* are they doing it with?)
- **Learning Tools** (the tools used to do the activity - *How* are they going to undertake the activity?)

When placing a given m-learning experience in the framework we say that for each dimension a system is either *student-led, teacher-led,* or *negotiated* (meaning that both student and teacher had some say). This gives us three classifications on each of the four dimension, and thus allows is to potentially distinguish between 81 different types of formality and informality. We capture this in shorthand using S, N or T for each dimension in turn (Student, Negotiated, Teacher).

The 4D Model allows us to step back slightly from disagreements about what constitutes formal learning, it shows that one's opinion of formal learning will change according to which of the four dimensions one holds most valuable. This is how different commentators can draw different conclusions about the formality of the same learning experience.

3.1 Case study : MOULE System

This case study shows how the degree of formality and informality in a system can vary according to the role that each student plays:

> *MOULE System* (Arrigo, Giuseppe et al. 2007) – A lecturer wishes to teach her students about the architecture in a particular square (**Learning Objective: T**), she sets up an activity in Moodle (**Tool: T**) that asks students to make notes about particular points of interest (poi). One interesting twist with this system is that students back in class can collaborate with the students in the field. The students are split into two groups in terms of their roles in the learning activity. Two Students, called Maria and Giuseppe, are engaged in the designed learning activity. Giuseppe is responsible for editing and updating the online wiki pages, in order to share the latest information with other students. He is based in a school classroom (**Environment: T**). Maria is asked to visit the square and is free to explore the space under Giuseppe's guidance (**Environment: N**). They can communicate with one another through the connection to the MOULE system and Global Positioning System (GPS.) In order to find the poi that has been described, Giuseppe will

monitor Maria and give her instructions by using the map navigator which shows where his classmates are, and when they are close to the poi and can take a photo using the built in MOULE toolkit (**Tool:T**). The photo will be uploaded to the server where Giuseppe is working by connection to wireless network (**Activity: T**).

Thus MOULE can be used (at least partially) in an informal way, but for the student in the classroom it is a more formal experience. Using our 4D model we would classify this m-learning experience as TNTT for Maria but TTTT for Giuseppe.

We can imagine that small changes could effect the formality of these scenarios in different ways, for example in MOULE the teacher could have let the student choose the way in which Maria records observations (informal tools), or could have asked her to come up with her own way of exploring the particular point of interest (informal activity). If all these changes were made it would radically change the scenario from TNTT to TSSS.

4. Visualising the 4D Model

The 4D Model allows us to categorise our four case studies in the four dimensions (five case studies if we treat Maria and Giuseppe separately). We have visualized this below in Figure 1 that shows the four dimensions as a 3x3 grid of 3x3 grids (a flattened hypercube). We have shaded each cell of the matrix to reflect the overall level of informality of that cell, the darker the cell the more informal it is (so TTTT is white, SSSS is almost black, and TTSS and SSTT are the same shade of grey. The number in a given cell represents each given system and is shown in a white circle over that cell (1a is Maria and 1b is Giuseppe). In effect this diagram shows a map of informality in our case studies.

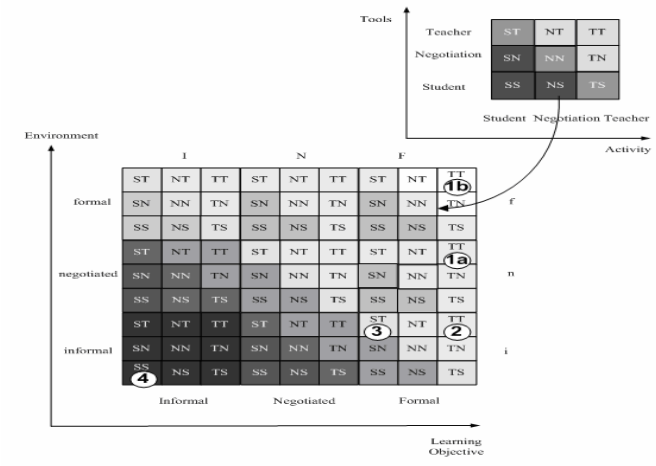

Figure 1: The Landscape of Informality in Our Study

Other case studies or systems can also be placed into our model such as 2: *Mobile Jigsaw Project* (Thompson and Stewart 2007) (TSTT), 3: *StudentPartner System* (Hwang, Hsu et al. 2007) (TSST), and 4: *Mobile Blogging* (Cochrane 2007) (SSSS).

Showing the dimensions in this way gives them equal priority, and shows how the spectrum of formality and informality is rather uneven. In practice individual analysts will probably prioritize certain dimensions over others (such as holding Learning Objective or Environment to be the most important), we have reflected this by choosing these two as the major (outer) dimensions, while the factors that are less discussed in the literature (Activity and Tools) are inner dimensions. However we do not wish to promote any one dimension over another, and instead believe that our model is useful as a way of understanding different measurements of formality in relation to one another.

5. Conclusion

In this paper, we have argued that different definitions of formality and informality in learning systems are the result of different perspectives about what aspects of a learning activity or experience are the most important. We have presented a four-dimensional model of formality based on Learning Objective, Learning Environment, Learning Activity and Learning Tools (derived from a traditional Why, Where, Who, What, When and How analysis). We have presented four case studies to show how our model can be used to classify a learning experience, including one system where the experience is different for users depending on their role.

We hope that our 4D model of formality in e-learning systems will be useful to those trying to reconcile different views of formal and informal learning, and will also enable the community to begin to analyze where current systems support formality (which dimensions are well covered) and where further work is necessary to support student-led learning.

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