A FRAMEWORK TO SUPPORT STUDENTS IN THEIR INDIVIDUAL STUDIES

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Abstract: Technology can be very effectively used to support students in their individual studies. However, this is a somewhat neglected area. The emphasis is on using technology to support dialogic constructivist learning environments. This is well justified, but can be problematic. Issues such as student diversity and engagement, the availability of tutor support within such environments and the demand for flexibility can profoundly affect the pedagogical effectiveness of students' learning experiences using these environments. This paper argues that the emphasis on dialectical constructivist learning environments would benefit from greater recognition of the importance of students' individual work. It also details a framework that supports tutors in designing learning experiences that encompass individual work as well as dialogic and collaborative work. The framework is based on three main constructs; Tasks, Narratives and Resources. It sets out a range of task types and also provides a model of resource production. In the narratives, it also provides tutors with a way of explaining their learning designs and engaging the students in them.

1 INTRODUCTION

The framework is comprised of three constructs; narratives, tasks and resources and is designed to support tutors in providing learning experiences that guide learners to an understanding of what they need to study, how they can study it and why they should do so. It was originally conceived as a framework to support online learners Pyper et al. (2007) because this is an environment where the risk of disengagement and subsequent impairment of learners' education could be most substantial. However, it is also applicable more generally in environments that make substantial use of educational technology in providing support for individual learning. The framework is inspired by and based on work by Weller et al. (2003) and Oliver and colleagues (1999, 2001, 2002).

Weller et al. (2003) were working with learning objects. A key aspect of learning objects is that they should be reusable. This means that they should be self-contained and decontextualised such that they do not refer to other learning objects.

One of the problems associated with decontextualising the learning objects is the loss of an educational narrative (Weller et al,. 2003). Narratives are widely considered to be important in education (McDrury and Alterio, 2002; Plowman et al., 1999), often in the form of storytelling. For this reason, a narrative learning object was provided that was designed to introduce the other learning objects and to integrate them in a theme for a given section of work. This was supplemented with the use of class discussions (Weller et al., 2003).

Oliver and colleagues (1999, 2001, 2002) provide a more abstracted approach by postulating a three component framework comprised of learning supports, learning tasks and learning resources. Learning tasks are the activities that students would be expected to engage in, learning resources the learning materials that would be available to them and learning supports describe aspects of the environment that support the learner, usually enshrined in the role of the tutor.

The framework is intended to provide a structure within which learning designs can be articulated and their different aspects described in terms of the three constructs above. So, the learning tasks, learning resources, and learning supports would vary depending on the learning design. The learning designs are intended to create a dialogic constructivist learning environment (Oliver et al., 2002).

The tasks, narratives and resources framework is influenced by the work of Weller et al. (2003) in their identification of the problem of the loss of narratives and by Oliver and colleagues work to provide an abstract framework that can be used to support the design of learning patterns. However, it diverges from the former in the extent and nature of the narratives provided and the latter inasmuch as it does not explicitly aim to create a dialogic constructivist learning environment.

Instead, the motivation behind the framework is to preserve the flexibility offered by the use of technology in education (particularly online) but to do so using designs that support the learner in their individual work. This does not represent a rejection of the importance of collaborative work and dialogues in learning design, in fact it is acknowledged as a fundamentally important aspect of learning and teaching. Rather, the contention is that the use of technology in education brings with it challenges that need to be addressed along with the potential for an enriching educational experience.

2 THE FRAMEWORK

As previously stated, the framework is composed of three constructs: Narratives, Tasks and Resources.

2.1 Narratives

The loss of narrative reported by Weller et al. (2003) is not a problem unique to learning objects, but one to which learning technology in general is vulnerable. Perhaps it is because narratives are often provided implicitly; substantial parts of tertiary education provision use inherently narrative forms (e.g. principally lectures, but also books and video (Laurillard, 2001)) and when the form is changed the narrative is lost. The result can be disjointed learning experiences whose rationale may not be explicitly available to the student, thereby impinging on their ability to make meaning out of what they are doing.

Narratives in the context of this framework are intended to have the following qualities:
- they are integrative- they provide structure to potentially disparate learning activities and resources;
- they are affective- the tutors personal opinions, views and experiences of a given topic are encouraged;
- they establish the level of discourse expected from students;

- they expose the tutor's conception of the topic at hand, an important part of initiating useful educational dialogues (Laurillard, 2001);
- they have a temporal aspect, so not only do they integrate learning activities and resources in the present but they link them to previous and future activities;
- they provide a rationale for what the student is being asked to do;
- they are reflective, this not only encourages reflective practice for tutors, but also provides an example of what the students are expected to do when they are asked to reflect themselves;
- it gives the tutor a more pervasive voice. As the students work, they get a sense that this is a course designed by the tutor, it reflects the tutor and is richer for it (it is not just some derivative set of learning resources);
- they support the metacognitive development of the students by exposing the metacognitive activity of the tutor;
- they foster the students' internal dialogue.

So, narratives have both a cognitive and affective role (Plowman et al., 1999). They are important in supporting students in placing their work in a coherent context and are intended to engage them with the tone of the narrative. Importantly, they provide a rich guide as to how they can engage in dialogue with the tutor and each other, even when they are not engaged in dialogue. Fundamentally, they bring something that is easy to lose in individual study and that is a sense of the human presence behind the design of the course.

Bruner (1986) differentiates between paradigmatic (logical argument) and narrative (story/ exposition) modes, something that relates well to domains in which the role of the narrative may be less clear. As an example Computer Science will be considered. As indicated before, narrative teaching forms make up a large part of teaching provision and so are inherently present in the teaching of Computer Science. However, in a technology-mediated, task based context, it is perhaps less clear. A significant part of learning Computer Science involves practice so a clear temptation is to create lots of tasks that emphasise practical work.

However, these tasks have meaning and rationale; they would not be set by the tutor if it did not. The implicit inclusion of these factors can usefully be made explicit in a narrative. Rather than using only a set of tasks to demonstrate control structures in programming, the tutor could provide a narrative specifying the importance of the control

structures, how they themselves approach their use, their own perception of the task at hand. In turn this could encourage students to express their own understanding of the topic. Initially a narrative account may seem more pertinent to them, and a combination of the paradigmatic and narrative could support them in framing their contribution to their learning.

The discussion of narratives has purposefully avoided grounding them in any particular technologies; indeed the framework as a whole is independent of technology. Nonetheless, there are implementation issues to be considered. There is a range of narrative media, any of which may be useful in mediating the tutors' narrative. However, in order to support the properties of a narrative as outlined above, the approach advocated in this framework is to offer a light narrative throughout the learning materials, something that is difficult to achieve coherently even using some of the narrative media (for example audio files and video files).

A key medium term aim of the use of narratives is to encourage students to construct their own narratives. This has been shown to be a useful means by which students can gain an insight into their own understanding of a topic (Plowman et al., 1999) and would also provide tutors with a rich representation of learners' understanding of a given topic.

Given a student population that is increasingly likely to be diverse in terms of their abilities and experience, it seems that this would be an important aid to the tutors supporting them on their terms.

2.2 Tasks

What the student does is the central construct in the framework, everything else is intended to support this. It is important to distinguish at this point between tasks and activities. Tasks are static designs; activities are what the student, alone or in collaboration with others, does with the tasks.

The framework essentially frames the curriculum design for a given course, and as such, has tasks as its remit rather than activities; these are the remit of the learner. What the learner does feedback into the learning experience and how technology influences it is something that is addressed in greater depth in terms of the production of learning resources. However, for the current discussion, the emphasis is on what the tutor does,

The influence of the tutor is substantial, both in terms of how they design the tasks and also how they engage the students in dialogue. However, with activities, learning should be led by the learner not

the technology and, especially in the case of individual learning, not the tutor. So, the design of the tasks is clearly crucial; passing control to the learner can drift into abandonment if the tasks are not carefully designed and sequenced to support the learner's learning activities.

For this reason, the framework includes a range of tasks that is designed to inform learners of the kinds of activities they are expected to engage in, and also to support tutors in designing effective tasks. Such decomposition has been criticised for artificially reducing the complexity of tasks (Jonassen, 2001), however, the decomposition is necessary to account for cultural (Zhu and Schellens, 2008) and individual differences as well as maintaining the flexibility of the learners' study patterns (Collis and Moonen, 2002).

Tasks come in six main types: Reading, Research, Exercise, Practice, Reflection, and Discussion. These cover a range of activities that may be described in abstract terms as acquiring knowledge, developing skills and making your own meaning of them through meta-cognitive activities and dialogue. The idea is that if a learning experience contains an appropriate range and sequence of these task types, then the student will be provided with a learning environment that provides strong support in their individual studies and also guides them into engaging with others on their course. Moreover, it does this without making undue assumptions about individual learners and minimises the demands on when and how they study.

The task types are relatively informal and broad in order to allow tutors freedom in their curriculum design and also to support students in their understanding of the structure of a given session of a course. More detail about the types is available to tutors, as set out below, and this information can be made available to students as deemed appropriate by the tutor.

Currently, the greater level of detail can be found in the sub-types of the tasks, for example, the different types of reading. These also provide tutors with greater fidelity in the composition of their tasks and allow for the extension of the task types through their input of new sub-types.

2.2.1 Reading

Reading tasks cover a range of approaches beyond the most obvious. Reading tasks can simply be to read something, but they can include other approaches including skim-reading, critically reading and further reading (usually optional).

2.2.2 Research

Clearly research is a key task in tertiary education; the research task type represents the information gathering, collation and evaluation required in academic institutions. However it also has a more general meaning than academic research. Specifically research as a task type does not include the production element of research, for example a model or paper; this is classified as an exercise task (see below). Sub-types of research include; interview, web searches, archive searches, the history of a given place.

2.2.3 Exercise

Principally these are tasks which explicitly provide students with feedback based on their performance. These include formative tests in a wide range of formats including more traditional exercises such as MCQs and short answer questions or critiques of papers. Clearly there is a very wide scope for how exercise tasks can be designed and how feedback can be provided, however, they need to be designed carefully in order to preserve the students' control of their learning and to avoid overwhelming the tutors. An exercise that set a short answer question and required students to respond within a specified time would likely be problematic both for the students and tutor. These are key tasks in supporting students' individual study.

2.2.4 Practice

Practice tasks provide explicit opportunities for students to consolidate what they have learned. Practice lends itself to skills development, something that in some domains is an intrinsically important activity, but in all domains is important in developing transferable skills. Practice also applies more generally than skills development. Abstract concepts could be restated in novel contexts and tested and students can take what they have learned and apply it repeatedly in their individual learning.

So, the level of guidance is an important issue here, and must be a consideration in the design of the task.

2.2.5 Reflection

Reflection tasks are complex and open ended. Students are encouraged to not only construct their understanding of an issue, but also to understand how they did it. The intention is that this enables them to become more effective at self-direction,

since they gain an understanding of how they learn. It also takes them from the domain of problem solving to one in which they can adapt their approach to problem solving; they are not engaged with the problem as much as they are engaged with strategies for solving it.

It enables them to not only approach a given proposition or problem in a conventional way, but also to assess the value of the approach. This is an essential part of tertiary education. It should be noted that reflection tasks, as with discussion tasks, are supported very closely by the narrative provided by the tutor.

2.2.6 Discussions

Within the framework, discussion tasks are included to emphasise their importance, and to inform the design of the other task types; they are not directly involved in the design of learning tasks that support individual learning.

Within this task type are a multitude of dialectical-constructivist (Moshman, 1982) learning patterns, and this is reflected in the range of possible activities; from simple discussions about a given topic to debates in which students must defend provided positions or take on specified roles.

2.3 Resources

Currently in the framework, resources is considered to be a unitary construct, because the research has focussed on methods of production, specifically the impact of intent (Pyper and Lilley, 2007, 2008a, 2008b). This does not mean that the categorising types of resources would not be a useful aspect of the research; indeed, such categorisation has been usefully applied tor media types (Laurillard, 2001). As such it is intended to be the subject of future work, once a better understanding of the impact of production methodologies has been developed.

The motivation for this was the idea that the way in which resources are produced is also an important factor in their educational effect. Setting out different types of resource categories would be usefully informed by an understanding of the potential impact of the way in which they are produced since this could effect a range of resource types.

A model for resource production, (Pyper and Lilley, 2008b) as shown in Figure 1, shows how learning resources may be created. Some learning or teaching activity generates learning content; this learning content varies across four main properties

(see below), such that it can be considered to be durable learning content or disposable learning content.
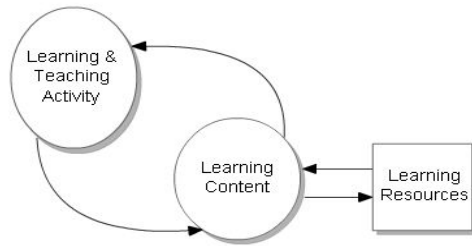

Figure 1: Model of resource production. The interaction of the process (learning and teaching activity) and the learning content (output) that may result in the generation of a product (learning resources) from Pyper and Lilley (2008b).

Disposable learning content, in the absence of technology, is only usually retained in memory in a processed form, if at all. It is usually verbal in nature. Durable learning content is designed to be retained, for example having quality control as part of its production cycle. It is also designed to be usable in contexts other than one within which it was created. This is much less the case for disposable learning content.

In essence, the distinction can be expressed in terms of intent; if learning content is intended to contribute to a learning resource or become one itself, then it is more likely to have the properties of durable learning content. If there is no such intent and the content is created as a by-product of learning activity, it is much more likely to be disposable learning content.

The following are properties of learning content:

- Intent: The motivation behind the creation of the learning content.
- Context: The extent to which the learning content is comprehensible or useful outside of the context in which it was created.
- Completeness: The extent to which the learning content contains enough information to be comprehensible to someone else.
- Longevity: The amount of time that the learning content intrinsically endures.

As an example, an educational dialogue between a tutor and a student could be described in terms of these properties. The conversation is a means to an end so is not intended to be the end product; the students improved understanding is. It is necessarily context dependent because the tutor must adapt their part of the conversation to the level of understanding shown by the student. It is unlikely to be complete, since partial sentences make sense and may be just

as useful as full, carefully crafted sentences in the conversation. Finally, the main way in which the conversation will endure is in a highly processed form in the minds of the participants. Most of the learning content (the words and phrases) does not endure at all.

Of these dimensions, the most affected by the use of technology, is longevity. This is because if the conversation outlined above was mediated by technology, it could be retained without any further action by the participants. The learning content (the words and phrases used) would be disposable in all other dimensions, but by changing one, it gains the appearance of durability. It is stored, and so can be accessed at any point in the future, but it has none of the other properties of durability as captured in the properties above.

The distinction between durable and disposable learning content has been supported by previous research (Pyper and Lilley, 2007, 2008a). The two content types are useful in different ways but when mediated by technology tend to be used in similar ways.

This is of concern, because students are already faced with an extremely information-rich learning environment and even more learning content is being added as resources to this environment. Most importantly this is often happening as an unconscious side effect of learning activity, not as a considered product of it. So, we may be cluttering up an information-rich environment that is already overwhelming. It could be argued that students must develop their information literacy skills for this very reason, and that the selection of useful or salient learning materials is part of that development.

However, there seems little need to add yet more content to the information environment in order to provide students with this aspect of their education. It is of most concern that this is often occurring as an unintended by-product of learning activity. Quite often, it results from the use of technology to mediate longstanding learning activities. Dialogues have been used as an important example of this, but the effects noted can also be seen in other contexts. Examples include podcasts or video captures of lectures, synchronous or asynchronous tutorials where all the data are captured.

In more general terms, this is also the case for any learning activity in which the end goal is poorly defined or understood. It is important to note that these are quite often features of tertiary level learning activities.

This gives some idea of the ubiquity of the issue. Where technology is used in education the lack of

distinction between durable and disposable learning content can have an effect. If this effect impairs students' education then the problem is indeed a substantial one. This issue has been described in terms of usability, for example, Mayes and Fowler (1999). However, the usability of a system is not at issue here. Usability is a function of the extent to which a system fulfils the usability requirements set down for it. A word processor might be considered highly usable. Additionally it could be used to produce a cogent essay or a set of notes that make little sense to anyone other than the author. The question is about the educational application of the technology, not its usability. Academic conventions do not gain in clarity from being described in terms of usability conventions.

It is preferred here to attempt to understand the issue in purely pedagogical terms. It may be argued that the lack of distinction between disposable and durable learning content represents the capture of cognitive states as behaviour. It follows that this erodes the distinction between learning and performance, and given the fact that some technologies that are most prone to the problem are designed to support learning, not test performance, then they are having unintended side effects.

3 FUTURE WORK

Having established the overall structure of the framework, future work will concentrate on detailing the different components and their interaction. It is anticipated that resource categories would be elucidated and the support they provide for different task types set out.

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