Perceptions of learning and perceptions of being taught: Adult learner reactions to an interactive website

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ABSTRACT

This study examines the reactions of a group of adult learners to an interactive website. Through questionnaires and semi-structured interviews, answers were sought to the roles of recognised prior knowledge and tacit knowledge in both intentional and incidental learning within this medium. Previous experience of the medium appears to have little influence on the perceptions of teaching and learning. However, the extent of the learners' pre-knowledge of the subject matter addressed within the site may be important to their perception of the learning environment. This influences their perceptions of what is relevant knowledge and their recognition of knowledge acquisition. That those with most prior knowledge initially failed to recognise learning is explained within a constructivist context. The need to consider the range, and the effects of the range, of adult learner prior knowledge when designing interactive websites is illustrated.

Keywords

Adult learner, interactive website, incidental learning, tacit knowledge.

INTRODUCTION

An interactive website exploring introductory geology has been created to support adult learners returning to education and those involved in interdisciplinary study requiring some knowledge of this discipline area. The site, described in detail elsewhere (Toynton,1998), is interactive in that the learner is encouraged to explore the site and to respond to the questions and challenges raised within it, with e-mail contact to the tutor being provided. It does not include areas for learner-learner interaction. In this sense it is a single-medium environment.

The approach to introductory geology teaching and learning with adults in the programme within which the website has been developed is one of discovery-learning through 'game-playing'. Hence the title of both the website and previous face-to-face incarnations of the method as 'Geological Jigsaws' (Toynton, 1995). The attribute of the interactive website crucial to the choice of this medium is the ability for this to both conceal and reveal information, including the scale and 'shape' of the site itself. 'Withholding' information from the student and allowing initial disorientation may appear to militate against learning. However, this approach is based on the proposal that:

> "Since the point of discovery-learning is that the learner is continually engaged in a process of trying to map the information being discovered onto her own developing framework of understanding, then

'getting lost' may be regarded as a desirable or even necessary part of the process of structuring." (Mayes, Kibby & Anderson, 1990, p125).

The criteria which informed the construction of the site were: to allow the learner to collect information and ideas, to place the methods of collection of this information within the processes commonly used by geologists (observation, correlation of information, deductive eliminism), and to ensure that although the learners have some freedom within the site, they have to visit all pages to complete the tasks set. This last criterion is met by encouraging learners to search for elements of a code word before being able to advance to a further section of the site.

The learners referred to are all 'adult learners' in the sense that they are involved in part-time higher education as non-standard entry undergraduates, and range in age from mid-20s to over 60. The aim of the study reported here is to ascertain the effectiveness of the website in adult learning within the pedagogic approach adopted in this programme. This requires an understanding of learners', rather than the tutors', perceptions of what they have learned, since the former is of particular importance in adult learning, as will be discussed.

THE TEACHING AND LEARNING STRATEGY

'Emplacement' is a term borrowed from geology. A large body of molten rock rising through pre-existing strata is 'emplaced' within the crust of the Earth. It does not reach the surface and may not manifest itself immediately and therefore may remain unrecognised. By remaining beneath the surface, it is only through time and the erosion of overlying strata that the nature of the emplaced material and its influence upon the surrounding rocks and the landscape are revealed and recognised. Translated to teaching and learning, in addition to recognised intentional learning, incidental learning may remain unrecognised (tacit). The pedagogy underpinning the website is designed to enable direct intentional learning while evoking prior tacit knowledge through its recognition and validation. At the same time there is also the potential to emplace further tacit knowledge.

Within the website there are a series of tasks to promote intentional learning. Through the completion of these tasks, the participants arrive at clearly defined 'correct' answers. The skills required to complete the tasks (e.g. deduction, observation etc.) are not made explicit and therefore form incidental learning. The site is based around the narrative of a murder mystery, and within this narrative is a great deal of further geological information, some of which is not directly relevant to the tasks. This is the information provided to encourage incidental learning and the emplacement of further tacit knowledge.

McConnell (1994) defines two forms of tacit knowledge: 'unconscious' and therefore not known to the self or others, and that which is known but not made explicit. The latter was previously described by Barnes and Edge (1982, p7) through "men (sic) always know more than they can say."

For adult learners new to a subject it is important to evoke and validate their prior tacit knowledge, since this combats lack of confidence in both learning in general and specific subject material. Since emplacement of tacit knowledge is a form of incidental learning from the perspective of the learner, but within this approach is intentional from the perspective of the teacher, then the learner may not at first recognise this as learning. By maintaining the potential for the emplacement of tacit knowledge, confidence is also maintained. This occurs through realisations by the learner arising from prior tacit knowledge when evoked at stages throughout the whole course. This strategy was first developed for use in face to face teaching, and has been successful over many years (Toynton, 1988). Whether this approach can work on-line, and insights brought to the process by taking it on-line, lie behind this study.

COLLECTION OF DATA

An initial questionnaire was used to gather basic data about the learners, such as their prior experience of website usage and of geology. Volunteer learners then took part in semi-structured interviews. This approach was employed on the basis of the large number of potential variables which might arise and its "purpose .....to find out what is in and on someone else's' mind.. to access the perspective of the person being interviewed" (Patton, 1990). The interviews were as open as possible, and conversational, but with a number of pre-determined areas to which the conversation was guided where necessary. These interviews were then transcribed and the transcripts interrogated in the light of issues, both pre-selected and arising from the interviews themselves. Nine volunteers were interviewed within two weeks of completing the tasks on the website. In the light of the limited numbers, the findings here are presented as an illustrative example rather than scientific experiment.

Of the nine interviewees, experience of the technology and of navigating through websites varied very widely, from the very experienced frequent user to the very limited user. These learners were ranked and are referred to henceforth as 'T1' through to 'T9' in descending order of prior experience of the technology. A similar ranking (G1 through to G9) is used to represent experience of geology, which ranged from previous degree-level study to no perceived knowledge.

LEARNERS' REACTIONS TO THE WEBSITE

Perceptions of learning

After a session of up to two hours on the website, all learners except the one most experienced in geology (G1) reported that during this time they had made the realisation of previously unrecognised prior (tacit) knowledge. New learning was initially recognised by only six of the nine learners. The three who felt they had learned nothing new were those most experienced in the subject (G1, G2 and G3). However, when during the interview the learners were questioned about geological information contained within the narrative rather than the exercises, it became apparent that all taking part had learned more than they had recognised. This suggests new tacit knowledge emplacement, even in learners G1 to G3. Only those with least experience of geology (G6 to G9) recognised they had learned about approaches or skills used in the subject. In all but one of these cases, this learning was only recognised during the interview.

From the perspective of prior experience of websites rather than content, there appeared to be no link with recognition of learning. Those who initially recognised no new knowledge were T1, T5 and T7. On other criteria throughout this study, there was no relationship found between levels of experience of the medium and any of the other variables discussed. This suggests a role for the amount of recognised prior knowledge of subject rather than medium in the recognition of further learning of content.

Perceptions of being taught

A series of issues arise in this form of teaching and learning relating to whether or not the learner 'feels' taught or perceives the presence of a 'tutor'. This also leads into the question of whether the learners feel ownership of the momentum for moving within and through the site, and of the learning within the site. Such ownership is an important criterion in making an activity authentic in a constructivist context (Hinebein, Duffy & Fishman, 1992).

In response to being asked whether or not they felt 'taught', responses from the learners varied from the simple "no" to the more thoughtful "no", though one added: "not taught in the conventional sense". All of the learners appeared to perceive a personality within the site, and all took this to be a positive attribute.

How the learners felt they had moved through the site may also be relevant. They were asked whether they felt free to explore, felt guided or even 'bullied'. G1 felt "guided through it". None of the learners responded that they felt bullied and there was a strength of feeling behind the desire not to be. However, two learners (G1 and G2), who did not feel 'taught', did feel they were "being made to jump hurdles" or "jump through hoops." These responses suggest an experience very different from the face-to-face 'taught' version. Though not 'taught', the learners did talk of being led or made to do things. Some did not recognise this as a learning experience. The non-ordering of tasks and absence of a tutor may have led to some feeling of ownership, but the references to "hoops" and "hurdles" suggests a limit to this. These responses suggest a perception on the learners' part of a hybrid environment between those of passive and active learning.

Learners' strategies

It may be unwise to refer to learning strategies in the interaction between the learners and the website, where some of the learners did not feel, until questioned, that they were involved in a learning experience. Therefore it may be better to think in terms of the strategies the learners used to arrive at the correct answers to the exercises.

The following findings are derived directly from the responses to questions in interview. Those learners with least experience of the subject (G6 to G9) admitted to having read and re-read much of the material. Careful initial reading was used by G4 and G5 and by two of those previously mentioned . 'Skim-reading' was largely restricted to those in the middle of the experience range, being deemed successful by G3, but attempted and deemed unsuccessful for G4, G5 and G9. G1 and G2 admitted to guessing rather than reading , and only returning to the text when recognising that some guesses were wrong. The reading strategy, when considered alongside the initial perceptions of learning, reflect the interview findings that G1 and G2 felt confident in their prior knowledge of the subject material, with G3 a little less confident. G4 to G9 had much less confidence

When guessing is considered as a strategy, it appears reasonable, as was the case, that those with little or no pre-knowledge (G7 to G9) did not, or could not, resort to this stratagem. That three of the learners of some experience (G4 to G6) admitted to guessing on occasion is similarly, not surprising. However, it may be significant that the three learners with the greatest experience of the subject (G1 to G3) did admit to using guessing as their main strategy. In particular, G1 stated that some answers had been guessed and yet claimed not to have learned anything new from the exercises, since all the information presented was already known. This is clearly contradictory. Guessing amongst the more confident learners may suggest that they assumed that they were involved in a test of their knowledge rather than a situation where they might learn.

The learner positioned on the boundary between those who were more, and those who were less confident (G3) raised the issue of guessing and returning to previous pages of the site as cheating. This again suggests a perception of being tested rather than being taught.

Learners' perception of the medium

The key to the learners' reactions to the website appears to be based around their perception of the nature of the medium itself. In response to being asked to draw parallels with more familiar media, their responses varied with levels of pre-knowledge of the subject rather than with experience of the website as a medium. Those with greater subject experience (G1 to G4) compared the activity on the website with 'informal' activities such as games and quizzes. Those with least subject experience (G5 to G9) compared the activity with more formal learning environments such as books, lectures or tests. However, it may be that the difference in perception between subject-experienced and inexperienced learners should not be viewed as a difference between equating the medium to either informal or formal learning. Rather the learners were divided into those who felt they were involved in acquiring knowledge and those who felt they were using or displaying knowledge. From this perspective there is no contradiction between 'knowing all' and 'guessing' since there is no expectation of the acquisition of knowledge. These learners experienced in the subject felt involved in a game.

All of the adult students felt too new to the medium to talk about it in terms of having its own unique characteristics. It appears from the comments of the interviewees that the validity of any knowledge acquired, and therefore its initial recognition or non-recognition, is partly based on the parallels drawn with other media. Where knowledge is acquired, but is not recognised as relevant or part of the normal process of the parallel medium, this may enter directly, or fade into, the 'reservoir' of tacit knowledge.

Summary of learners' reactions

The learner with previous degree-level study in geology (G1):

- Was the only participant not to recognise prior tacit knowledge while on the website.

Those learners with greatest prior knowledge of geology (G1 and G2);

- Felt they were being made to 'jump through hoops'.
- Likened the experience to participating in a quiz, puzzle or game.
- Guessed or skim-read for answers to the exercises.
- Initially acknowledged no new learning.
- After discussion realised that incidental tacit knowledge had been gained.

The learner with slightly less prior knowledge of geology (G3), in addition to the above:

- Viewed returning to previous screens as cheating, suggesting a feeling of being tested.

The learners with still less prior knowledge of geology (G4 and G5)

- Likened the experience to more formal learning media.
- After initially skim-reading, returned to read carefully.
- Recognised new learning without prompting.
- Did not initially recognise learning of skills.

The learners with very little or no prior knowledge of geology (G6 to G9):

- Likened the experience to formal learning media.
- Read and re-read the contents.
- Recognised prior tacit knowledge.
- Recognised new learning, inclusive of skills.

Recognised without prompting the learning which was tacit for those with more experience.

There is no systematic variation in learning or perceptions when the learners are ranked by experience of the medium.

ADULTS' PERCEPTIONS OF LEARNING IN A CONSTRUCTIVIST CONTEXT

When returning to a more formal learning environment, adult learners normally bring a measure of 'life experience'. Within this may be the results of many years of informal and incidental learning in the forms of both overt and tacit knowledge. Problem-solving skills and an awareness of multiple perspectives and complexity are often well developed.

Face-to-face teaching of adults generally relies on discussion and drawing on the 'experience' of the learners to a far greater extent than with younger age groups. In discussing theoretical approaches to designing hypertext, Foltz (1996) emphasises the importance of incorporating information into a pre-existing knowledge base and of the importance of the individual and their background on the way that the person learns or interprets knowledge, and that new knowledge must be interpreted in terms of prior knowledge.

Within the constructivist analysis of teaching and learning, learning arises from the active engagement of the learner to construct a personal interpretation of the world. Construction of frameworks of personal knowledge and meaning through life experience within varied contexts is reminiscent of the concept of the apprenticeship. However, if adult learners are accepted as having served such an apprenticeship, it brings with it constraints. Key factors for such learners are not only the accumulation of the knowledge and understandings derived through life experience, but also the recognition and validation of these. Only then are the conceptual frameworks recognised into which new knowledge can be accreted. The constructivist perspective takes that "in the absence of a real-world, relevant context for learning information, the information is less meaningful" (Jonassen, Mayes & McAleese, 1993). Even when relevant contexts are presented, there will be a difference in the understanding developed within a simplified compared to a 'full stimulus environment' (Hinebein et al., 1992). The ‘apprenticeship’ of the adult learner in life experience is therefore a key construct. This is the justification for the narrative within the website, which aims to emulate a real-life context, since it is in real-life narratives and full-stimulus environments that the apprenticeship of the adult learner has been served.

The discovery learning approach of this website, being introductory to the subject, may appear to be counter to the idea that "constructivist learning environments are most effective for an advanced knowledge stage of learning" (Jonassen et al., 1993) and also that such learning also requires specific goals. Can the incidental learning encouraged though discovery play a useful role in the construction of knowledge for the adult learner? It is in this context that the adult learner specifically may have an advantage. Such a learner, whether or not aware of the fact, will have had the potential to developed a framework of generic skills (understanding of problem solving, complexity, real-life narratives) through which new learning, including incidental learning, can be understood and accumulated. In this way, the initial lack of prior acknowledged learning and a clear goal within discovery learning, which may be disadvantageous to those with a subject-knowledge framework, should not be disadvantageous to the adult learner with a knowledge framework based around generic skills and experience-based understandings. Generic or subject-based, it is the existence of a framework which is important, as stressed by Mayes (1992) in stating that "as we build a framework, or schema, for comprehension, we build a mechanism for automatic learning."

The perceptions of learning within this study display simple yet contradictory patterns. Learners with more experience of the subject perceived that they had learned less, or even nothing, while those with less subject experience perceived more learning. This appears perfectly intuitive. Those with more experience only recognised when challenged that tacit learning had occurred, while the less experienced learners gained similar knowledge and recognised more of it immediately. This is less intuitive. One approach to explain this contradiction is through the learners' perceptions of the environment. Those who did not at first recognise any learning had not felt themselves in the equivalent of 'a formal learning environment'. However, adult students normally recognise that important knowledge is gained outside formal learning environments.

A better explanation may be approached through the consideration of schemata, or frameworks for comprehension within the constructivist model. Three different schemata may be involved in this situation, though it is accepted that each individual may be considered as having developed a unique composite, for clarity they will be considered as distinct entities. They are:

Experience and understanding of the medium and the technology.

Experience and understanding of the subject content and its methodologies.

The 'apprenticeship' of adult learners through real life problem-solving and perspectives.

Since it was the learning around the subject content and methodologies that the participants were asked to consider and evaluate, learning around the medium itself was not addressed by any of the participants. There is no discernable relationship between stated

experience of the medium and subject knowledge perception. Any schema relating to the medium and the technology is therefore not relevant to this discussion.

The pattern of perceptions of learning can be interpreted through consideration of the schemata of 'subject' and 'apprenticeship'. All of the learners considered here can be assumed to have the latter schema, while the sophistication and therefore usefulness (or even existence) of the former schema can be expected to decline down through the rank order of geological subject experience. Perhaps perceptions of learning are recognised according to the dominant schema, which, where well developed (G1 to G3) will be the 'subject' schema since this is the central theme of the website. Where the subject schema is less developed (G4 to G9), the apprenticeship schema will be dominant.

According to Mayes (1992) "it is hardly possible not to learn something which has provided meaning. In fact, it does not seem to matter much whether there is an actual intention to learn or not". All of the material within the website is presented within a framework of meaning, and so all may be learned, though not necessarily intentionally or consciously. "Browsing may well result in learning, as will any engagement with information for which appropriate schemata already exists" state Jonassen et al. (1993), and hence G1 to G3 created tacit knowledge while feeling they had only skim-read the contents. That "studies of incidental learning have shown that people often remember rather little about familiar objects" (Mayes, 1992) may explain the failure of these learners to recognise that learning had occurred. Learners G1 to G3 were familiar with the subject area and with the nature, if not the precise content, of the specific information within the narrative. Furthermore Drew (1998) emphasises the importance of explicitness of purpose to student acknowledgement of learning. The lack of an initial goal within the website may be complicit in the learning being tacit. The same learners did not feel they had learned about methods and approaches to geology, nor did they recognise them being addressed in the website, since these already formed an important part of their dominant schema.

Where the subject schema is absent or poorly developed, then what Rumelhart and Norman (1978) refer to as 'tuning' rather than accretion of knowledge will occur. This is the situation in which information is acquired incidentally with no new schemata being developed. If learners G4 to G9 are considered to be in this situation, then their perceptions of learning contradict the assertion of Jonassen et al. (1993) that "browsing in a domain for which no properly developed schemata has yet been constructed is not likely to lead to satisfactory knowledge acquisition at all." As adult learners, this contradiction may be explained by the problem-solving and complexity aspects of the website material, allowing learning to occur by accretion within their 'apprenticeship' schema. The unfamiliarity of the material (compared to G1 to G3) would militate against tacit learning, explaining the awareness of these learners of their new knowledge, even in those areas learned only tacitly by the more experienced participants.

Learners G4 and G5, while considered in with the group previously discussed, were distinguished by not recognising initially that they had learned anything about approaches or methodology. This is the one aspect they have in common with learners G1 to G3. This suggests an intermediate situation where incidental learning is overt and yet the subject schema is sufficiently developed for issues of methodology to be familiar enough to be learned tacitly.

CONCLUSIONS

From this case study, previous experience of the medium and the technology appears have very little if any influence on the interactions with, and the perceptions of teaching and learning from, this inter-active website. However, the learners' levels of pre-knowledge of the subject appears important to what the learners feel they are involved in and their perceptions of what knowledge has been acquired. There is a contradiction between those with more developed schemata who learn, and may even learn more than others, but who may not recognise this tacit learning, and those with less developed schemata who are more likely to recognise their learning.

Initially the 'Geological Jigsaws' course was developed specifically for adult learners through face-to-face teaching and learning. An important characteristic of any group of adult learners is the wide range of prior experiences within specific subjects and of learning through life experiences. One commonality is a tendency not to recognise the validity or even existence of such knowledge on returning to study. In developing sophisticated pedagogic stratagems within websites, especially those which are not part of 'mixed-media' programmes, the developer must be aware that a group of adult students may not react in a simple or unified way, and that no tutor may be present to mediate these reactions. The learning that occurs, the perception of what that learning is, and even the perception of the nature of the experience they are involved in, may vary greatly from student to student in a complex way. By discussing this in terms of frameworks of understanding (schemata) such variations may be better understood and predicted and therefore incorporated into the pedagogic elements of future interactive website developments.

Interaction with most educational websites will result in the emplacement of incidentally acquired tacit knowledge, which, whether or not deliberately used as a stratagem, needs to be recognised by the author of the site as well as, at some future point, the learner. In this way the richness and distinctiveness of the medium will be perceived by both.

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