Vicarious Learning from Tutorial Dialogue

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Abstract. Vicarious Learning is learning from watching others learn. We believe that this is a powerful model for computer-based learning. Learning episodes can be captured and replayed to later learners: a natural context for this is learning embedded in dialogue. This paper briefly surveys aspects of the theoretical basis of how learning may work in these contexts, and what is needed for a deeper appreciation of the mechanisms involved. A project that applies these ideas is also discussed, in which vicarious learning from tutorial group dialogue supports an online learning community that creates new learning materials as a group activity. We postulate that the resulting combination of shared activity with broader perspectives holds strong promise for online vicarious learning.

1 Introduction

The objective of this paper is to address the potential for online learning communities to exploit vicarious learning (VL), focussing on dialogue in learning. We work to understand how dialogue can facilitate VL, and develop a discussion of factors that may condition the effectiveness of such learning. A key question we address here is whether we can coherently picture the vicarious learner as a "vicarious participant" in dialogue, and how we can facilitate such participation through the appropriate use of technology.

2 Vicarious Learning and Dialogue

The idea of learning vicariously — through the experience of others — was introduced by Albert Bandura (e.g. 1986). It arises in situations where a learning experience is witnessed, *and reacted to as a learning experience*, by another learner. Because of this emphasis, vicarious learning is distinct from observational learning that arises from exposure to expert performance. A common example is the master class, where well-known teachers work with individual students in front of an audience of others, to the benefit of all. Such processes can be mediated by using communications technology to capture experiences for access by other learners at a later time (Lee 2005).

The learning process needs to be articulated and externalised if it is to be available to other learners. Dialogue with a tutor or peer learner naturally externalises learning processes, as the participants elicit explanation and clarification from each other. The centrality of dialogue in learning is also argued by Laurillard (1993) to be distinctive

of higher education. VL postulates that it's possible to learn important aspects of the language, as well as the conceptual content, of a discipline through exposure to other people learning it and using it in learning. Though it is important at some stage to engage directly in dialogue and become an active user of the language, it seems clear that there is a substantial role for VL in the above sense.

Relatedly, Donald Schön (1985) claims that many professions are rooted in practice and "reflection in action", arguing that learning must be through practice, but also through dialogue with expert practitioners, who induct the learner into the forms of discourse (and hence reflection) characteristic of the profession. The design "crit" is a prototypical case of VL occurring through and around the central role of tutorial dialogue in learning.

The learner of the language of a discipline is entering a community of expert practice (cf. Wenger, 1998), also as one of a community of other learners sharing in the process. Such a community promotes a certain empathy or mutual understanding between its members, of a kind hypothesised (Cox et al., 1999) to be especially important in supporting VL. As we argue further below, empathy is perhaps at root what allows VL to work, counter to constructivist intuitions that "real" participation is indispensable for situated learning.

Hence we propose that episodes of learning mediated by dialogue can be captured and made available for the benefit of later learners. This raises issues such as: how effective dialogues can be facilitated, captured, stored and re-used, integrated into other practices, targeted to a new problem, understood by other learners — all these remain topics for research. Later we discuss two experimental approaches to putting re-use into practice.

3 Vicarious Participation in Dialogue

Students presented with VL materials are in the position of "overhearers" with respect to the original dialogue. Although Schober and Clark (1988) argue that overhearers are inevitably much impoverished in their understanding of a dialogue, Lee et al. (1998b) suggest that a closer examination shows the overhearers to have been actually rather successful in understanding dialogues, especially if able to observe them from the start.

We propose that there can be, in effect, "vicarious participation" in dialogue, such that the overhearer is able to get some of the effect of direct participation (cf. also Lee, 2005). This will depend, evidently, on the overhearer sharing significant aspects of the "common ground" shared by the participants. Schober and Clark argue that this common ground is collaboratively constructed, but clearly the construction is helped by the fact that their participants already share a great deal: the same language and the same general cultural background, etc. Similar overhearers will have a similar head start. Again, a form of empathy between participants and overhearers drives vicarious participation, so that e.g. students are likely to share more with other students than with tutors (cf. Cox et al., 1999).

3.1 Perspectives and Activity

Fox Tree and Mayer (2008) offer a somewhat related analysis, showing that overhearers pick up more when there are more "perspectives" involved in the dialogue, and

arguing that this is partly why dialogue may be more effective than monologue for VL. Presumably the recognition and "uptake" of the perspectives also implies a degree of attunement between the overhearers and the original participants. This idea has a broader, perhaps more metaphorical, extension to many ways in which people's conceptualisations of a situation may relate, with potentially wide application, especially to areas such as learning (e.g. Greeno and MacWhinney, 2006). It then appears natural that one should be able to share the perspective of someone in an overheard conversation.

A key insight in the view of Schober and Clark (if by no means unique to them), is the essentially constructivist idea that activity is important in creating informational states, and that somehow this activity itself needs to be shared if effective alignment is to be achieved. The key focus of the activity in these dialogues, exchanging and sharing information and abstracting it further, is on the cognitive level of the activity. We suggest that the overhearer can engage at this level much more on a par with the direct participants and can identify with a participant closely enough to go through a very similar constructive process during the dialogue, arriving at a state almost as effectively aligned. As usual, this will only work to the extent that it is a socially grounded process.

Chi et al. (2008) introduce the "active/constructive/interactive observing hypothesis", in which learning is dependent on the degree of active engagement of the learner. They show that vicarious learning done collaboratively by pairs of vicarious learners increases engagement, compared with lone vicarious learners, producing improved learning that rivals direct tutoring. The collaborative interaction develops a constructive activity based on that of the original learner — perhaps this either strengthens "vicarious participation" (in the original learner's activity), or supplements it with a direct participation (in the observing dyad's activity) that is stimulated by the original material. Chi et al. argue that active interaction is the critical factor in learning, and that the lone vicarious learner is disadvantaged relative to the pair. A little tangential to our question concerning how vicarious learners pick up on the learning of the original learner, Chi et al.'s hypothesis does not seem to imply that vicarious uptake is in itself improved, perhaps rather that it is better exploited; but it's also possible that the observers' engagement with each other enhances their empathic engagement with the original learner. Closer analysis of alignment might help distinguish these possibilities. We propose to construe a more extended learning community that fosters, strengthens or builds on vicarious learning as an extension of the vicariously learning dyad: an opportunity for language and perhaps conceptualisations to be shared. In all such cases, empathy and social grounding seem inevitably important facilitating conditions of the relation to the original learner.

4   Approaches to Vicarious Learning Technology

There are various possible models of how vicarious learning can be put into practice. One approach is to offer specific materials as assistance to learners in situations that are identified as similar. This capitalises on a presumably maximal engagement between the learner and the original dialogue, but is expensive and complex to implement. An alternative is to put the learner in charge of identifying appropriate materials,

and develop a learning community around this activity. We discuss here examples of these approaches.

In a concluded project (http://www.vicarious.ac.uk/), we investigated the use of VL in the education of speech and language therapists. An existing learning system, PATSy, provided a set of "virtual patients", including video interviews, case histories, test results, etc., which students studied as an aid to developing skills in diagnosis. Since it is often not easy to find natural situations where good learning dialogues occur frequently (Lee et al. 1998a), we adopted a methodology of using "Task-Directed Discussions" as a stimulus to dialogue, and developed a range of these for use in the PATSy situation. We built an extension to PATSy that detected points of possible intervention and then offered appropriate VL materials to assist the student, based on a theoretical characterisation of the reasoning process (Cox et al., 2005; Cox and Pang, 2007).

This approach was quite effective overall, but clearly very expensive to develop for any given domain. The second approach requires close attention to how we might exploit naturally occurring dialogues. Aside from the problem that good quality learning episodes may not occur all the time in natural learning situations, we in any case have no general way to identify such episodes, especially automatically, and especially for reuse in VL. There are many reasons for this, not least that the potential value of a dialogue to a vicarious learner is often dependent on that particular learner. Allowing the learners to identify the dialogues that they themselves find useful appears natural, but to achieve this we need to develop a means of engaging them with the material enough that they will locate and annotate the useful segments in stretches of otherwise less interesting dialogue.

We are investigating this second approach in an ongoing development we call *YouTute*. We collect naturally occurring tutorial dialogues as unedited video. Three streams are collected per tutorial (two from cameras, one from a "Smartboard"). These are later played in synchrony via a web-based interface that allows students to review the material and "edit" it by identifying segments that are of interest. These segments ("tutes") can be named, tagged, annotated and shared with other students. Students are able to see texts of relevant lecture slides, and the questions being discussed in the tutorial. The system has been deployed on several courses, is well received by students and seems to have worked especially well as a revision aid (Rabold et al. 2008). Trials have been in relatively formal aspects of computer science, where tutorials are conveniently well structured. It has yet to be trialled in other, especially less formal, subject areas such as design or the humanities. A screenshot of the system in use appears overleaf in Figure 1.

There are many differences from the VL-PATSy case, especially that the process of editing the videos and selecting "good" dialogues, which has become the responsibility of the students, has also become a shared activity. It is a form of "social networking", through which a community of students can emerge as learners who collaborate to create a new learning resource. This shared activity is also itself a learning activity, promoting reflection on the topics discussed, and re-evaluation of the original tutorial discussion. *YouTute*, we hope, allows us to enjoy many of the benefits identified by Chi et al. (2008) in the collaboration between vicarious learners. It remains to be established clearly that collaboration through an online social learning network is directly analogous to face-to-face discussion, but important elements

seem to be shared. There is the added twist that our original material is not simply dialogue between a pair, but is a multi-party interaction that may involve six to eight participants. We hypothesise that greater interactivity of this kind promotes articulation and externalisation. In particular, it probably increases significantly the number of perspectives taken on the learning topic, which as we have noted is argued by Fox Tree and Mayer (2008) to be especially valuable to vicarious learners. They define "perspectives" (not necessarily in the same way as others) as the different descriptions people use for similar things, and show that dialogue promotes more perspectives than monologue. It seems clear that in a multi-party dialogue there are likely to be even more different descriptions than in the two-party situations considered by Fox Tree and Mayer. Demonstrating that this is so, and that it produces measurable effects for vicarious learners, remains work for the future, but we are optimistic.

Fig. 1. *YouTute* interface

5 Conclusion

In conclusion, we suggest that we have shown good reason why vicarious learning should be expected to be a successful approach in general. We have developed aspects of the underlying theory of alignment and social grounding to underpin this claim. We have discussed two approaches to implementing it in learning technology, and propose that our *YouTute* system promises to exploit it most effectively by deploying notions of social learning, shared activity, and multiple perspectives. If we can thus combine the benefits of learners collaborating to develop a shared activity, with those of learners deriving broader cognitive stimulation from a wider range of perspectives in the material to which they are exposed, then we should see significant gains in the power and potential of vicarious learning.

Acknowledgements

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