Group Interaction Prompted by a Simple Assessed Open Learner Model that can be Optionally Released to Peers

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Abstract. This paper describes a study of a simple open learner model that can be optionally released to peers in named or anonymous form, to facilitate collaborative and competitive learning in a situation where the learner model contents contributed to students' assessment. Results suggest that, under the right conditions, students may start working sooner; discussion amongst students can be increased; many will find the individual learner models of others useful; and most will open their model to other users even if they do not find peer models helpful themselves - thus ensuring the availability of peer models for those who wish to use them. We consider the extent to which these findings may be transferable to other settings.

1 Introduction

Open learner models (OLM) are learner models that are accessible to users. Reasons for opening the model to the learner include promoting reflection; and encouraging learners to take greater responsibility for organising their learning, facilitated by the information about their current knowledge state as represented in their learner model [1]. It has also been suggested that students working together on a task may benefit from being able to access a group model [2], and that access to the individual models of peers working on a task may prompt spontaneous peer tutoring [3]. Less attention has been directed at allowing students to access the learner models of each other in a more open context alongside a course, where students can: use peer models to help them find collaborative partners or helpers; work independently, competitively using peer models to help them identify whether they are ahead of other learners; or identify cases where they thought they were doing well but, in fact, are struggling in comparison to others. Access to the models of peers in this type of learning context may motivate students to work harder, and students can also be reassured by seeing that they are not the only person experiencing a particular problem at the time.

This paper introduces OLMlets, a simple OLM to help users identify their learning needs. Based on UMPTEEN [4], OLMlets permits learners to grant others named or anonymous access to their model. We describe a study of OLMlets in a 3rd year university course on Interactive Learning Environments, where the model formed 10% of the course mark. Thus students had extrinsic motivation to work with OLMlets as this contributed to the assessment and, given the nature of the course, they also had an understanding of educational technology (with a particular focus on intelligent tutoring systems), so were able to appreciate the benefits of OLMs. The aim in this paper is to provide an indication of what *can* be achieved with a simple OLM that can be released to others, and to consider which aspects might transfer to contexts where students have no specific interest in educational technology, and where the instructor may not wish to assess the learner models.

2 The OLMlets Open Learner Model

OLMlets is domain-independent, designed for a range of course types, so the learner modelling is quite simple in order that it may be easily deployed with minimal information required from instructors. Relationships between concepts or prerequisite requirements, etc., are not modelled; OLMlets simply uses responses to multiple choice questions input by the instructor to infer knowledge level and misconceptions - where misconceptions are defined by the instructor (see [5]). In this Interactive Learning Environments course, questions were designed to elicit problems most

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commonly found in coursework, e.g. confusing a domain model with a simple (e.g. text) description of a subject; confusing a learner model with a percentage based on all answers (regardless of their relevance to current understanding); the belief that matching an interaction to learning style will necessarily lead to improved learning; the belief that educational evaluation is about whether students like a system (i.e. not considering learning gains or other learning issues). Modelling occurs over the last 5 attempts at questions on a topic, with heavier weighting on the more recent of these responses to maintain the focus on current knowledge - the weighting increases by 0.3 for each successive answer of the 5 contributing to the learner model of a topic. This is represented in the model by a figure between 0 and 1, with 0 indicating no knowledge and 1 full understanding.

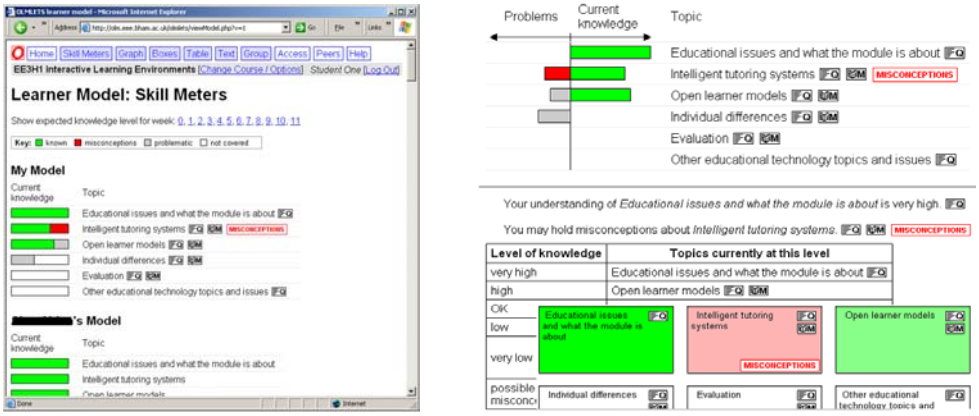

Figure 1. Open learner model: left - skill meter (showing own model and peer comparison); top right - graph; bottom right - text, table, boxes (combined image)

The most common presentation method for simple OLMs is the skill meter [4,6,7,8,9]. The size of the colours in the OLMlets skill meter indicates knowledge level, areas of difficulty, and misconceptions (see Figure 1). OLMlets offers 4 further presentation formats: graph (with positive and negative information on different sides of an axis); text (short statements of knowledge); table (topics ranked according to knowledge); boxes (with colour representing knowledge). Previous work found that skill meters were the most commonly used, but some students did prefer other representations, or used the skill meters in combination with one or more other presentations [10]. Where the existence of misconceptions is shown, students can obtain a description of the applicable misconception(s) by clicking on the link. This is then displayed as defined by the instructor in the form of a sentence prefixed by 'You may believe that…', which remains visible in the OLM unless the student hides it. An example for this course is: 'You may believe that a system does not have to understand the learner model'. Students can also access a comparison of their knowledge to the instructor's expectations of knowledge for each stage of the course (illustrated with the skill meters in Figure 2); and information about the distribution of the group's knowledge for each topic, with a star indicating the learner's own position for ease of comparison. The aim is for students to use OLMlets to help them identify areas of difficulty, and then undertake the necessary reading (using links within OLMlets to course notes or external online information accessed from the 'M' (materials) icon in Figure 1, or finding relevant information independently); or discuss problems with peers. Thus, OLMlets does not itself tutor or contain learning tasks: the intention is that students retain responsibility for organising their learning. The above features have been found useful in 5 university courses at different levels [5]. New to this version of OLMlets is the ability to access individual peer models (the student's own model is at the top, with others appearing underneath - see Figure 1); and the ability to selectively open one's model to other users. In this paper we therefore concentrate on the use of peer models. Figure 2 shows the manner in which students release their model. The top part of the table lists the course topics in the first column. Students are listed in the lower part of the second column (names have been hidden here), and instructors are listed in the lower part of the third column. Students can choose which parts of their model to release to each group - all, selected or none (upper cells), also allowing students to select which topics to release; and whether to release their model named or anonymously (middle cells). Students may create new groups to release their model in different ways to different users (e.g. named to friends and anonymously to others). These groups are populated by dragging and drop-

ping a user's name into the new column (group) they have created. Students can opt to view all or selected models available to them (or view no peer models), in any of the five formats (Figure 1).

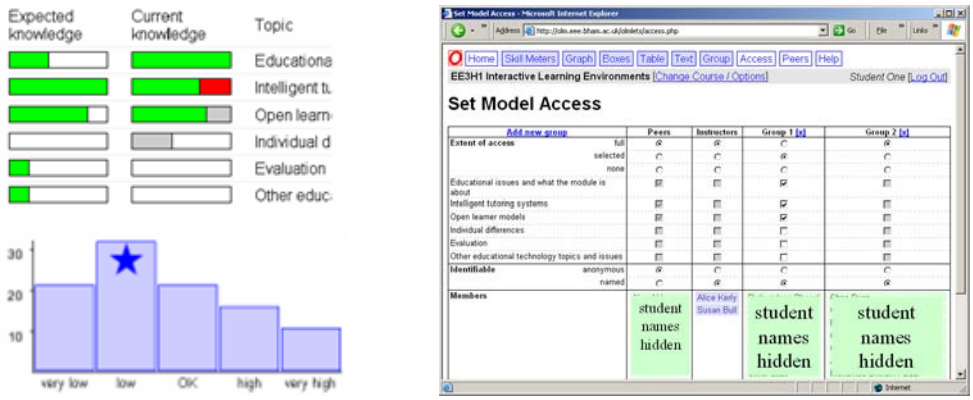

Figure 2. Comparisons: top left - instructor expectations comparison; bottom left - group distribution; right - releasing the learner model to other users

3 Viewing Peer Models and Opening the Learner Model to Peers

This section presents results of the use of the OLMlets peer models.

3.1 Participants, Materials and Methods

Participants were 29 students in their 3rd year of a 3 year BEng or 4 year MEng degree in Computer Interactive Systems, Multimedia Systems or Computer Systems Engineering. Students used OLMlets alongside a course on Interactive Learning Environments. They therefore had a theoretical knowledge of learning issues relevant to educational technology, including an introduction to the potential educational benefits of OLMs. The OLMlets learner models contributed 10% to the course mark, the learner models being recorded for assessment at the end of the course. The course lasted for one term, assessed additionally by an introspective analysis of the student's own learning (10%) and an educational technology design/evaluation report (80%). OLMlets was introduced in a 1 hour lab. Subsequent use was at times and locations of students' choosing. Results were obtained from questionnaires, system logs and the learner models. Questionnaire statements required responses on a 5 point scale (strongly agree - strongly disagree). We here combine responses of strongly agree and agree (labelled agree), and strongly disagree and disagree (labelled disagree). 28 questionnaires were returned, 3 of which did not permit their use for research. Thus the questionnaire results presented are from 25 students (86% of users, 89% of questionnaires). Additional information about group interaction was obtained by retrospective reflection of a course member.

3.2 Results

Table 1 shows the number of questions answered, and the final learner model representation achieved. The learner model figure is an average over the 6 topics, each of which is represented in the underlying model by a value between 0 and 1. All students answered over 100 questions (range 117-700; mean 261; median 210). Nearly all achieved an expert model (1.0) by the end of the course. Only 3 achieved lower than 1.0 (0.4, 0.94, 0.96), with only 1 of these unacceptably low.

Figure 3 shows questionnaire responses about one's own and peer models. All students found their own model useful, and nearly 90% found comparing their model to the knowledge expected by that time (defined by the instructor), to be helpful. The group comparison was preferred by fewer people, with around half finding it useful. Individual peer models were found least useful when they were anonymous - but were still considered helpful by around 30% of users. In contrast, 56% were interested in the named models of peers, finding these helpful for their own learning.

Table 1. Usage levels and final learner model state

	Mean	*Median*	*Range*
Questions attempted	261	210	117 - 700
Final learner model	0.98	1.0	0.4 - 1.0

Table 2. Releasing the learner model to peers

	Named	*Anonymous*	*Named/Anon*	*Hidden*
Week 3	5; 1 (some p)	4	1 (part, some p)	18
Week 5	13; 2 (some p)	4	1	9
Week 7	16; 2 (some p)	4	1	6
Week 9	18; 1 (some p)	2	2	6

Table 3. Number of logins and accessing peer models

Peer model access:	*0-1 accesses*	*2-5 accesses*	*6+ accesses*	*Mean qs*	*Median qs*
3-7 logins (n=9)	* * * * *	* * * *		189	175
8-12 logins (n=10)	* * *	* * * * *	* *	280	236
13+ logins (n=10)	*	* * * * *	* * * *	307	238

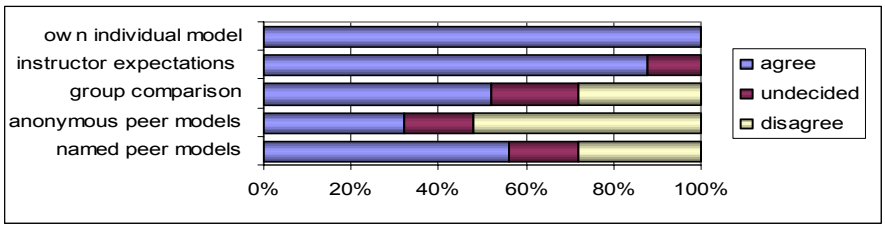

Figure 3. Utility of the individual and peer models

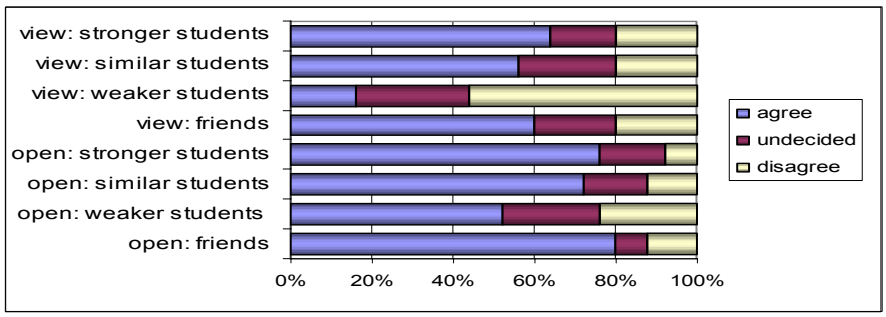

Figure 4. Viewing and opening the learner model to peers according to ability and friendship

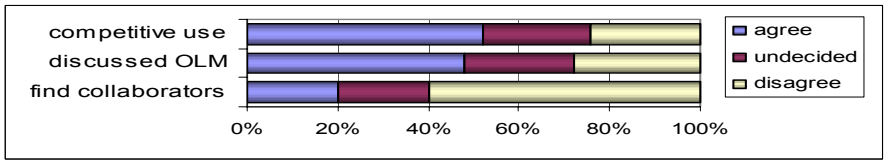

Figure 5. Collaborative and competitive use of peer models

Taken from the system logs at fortnightly intervals, Table 2 shows the points in the course at which students chose to release their learner model to others, and details of the way in which they released it. In week 3 students had been using OLMlets for 1 week. At this stage, 11 of the 29 students opened their model to peers. 1 of these opened part of their model (the stronger topics) to selected peers only, to some named and some anonymously. 1 other student also opened their model to only some peers, but released to each of these a full model in named form. The remainder releasing their model opened a full model to all peers either named (5), or anonymously (4). By week 5, 20 of the 29 students had released their model, all releasing a full model. 9 kept their model hidden from peers. Most who opened their model to peers, opened a named model (15), though 2 of these opened such a model to selected peers only. Of the remainder, 4 opened an anonymous model to all peers; 1 opened their model to all peers, but to some named and others anonymously. The pattern in week 7 was similar to week 5, but with 3 models that were closed to others previously, now opened fully to all in named form. The final row shows how students had

released their model by week 9, the point of assessment. All 23 releasing their model, released a complete model. The majority (19) opened it to their peers with their personal identifying details, but with 1 of these releasing their model to selected peers only. 2 opened their model to all anonymously, and 2 opened it in different ways to different people. 6 still kept their model hidden.

The 11 users releasing their model at the start of the course had varied models - some strong for the stage of the course (5), some quite weak (4), and 2 on track. The strength of a model was not a strong predictor of whether it would be released named or anonymously: there were 2 named and 3 anonymous strong models, 3 named and 1 anonymous weak models, and 1 named and 1 named/anonymous 'on track' models. However, those releasing their models later, appeared to release them when they felt they were adequate - i.e. newly released models were rarely weak.

Despite the instructor expectations comparison, students had different approaches to completing their work with OLMlets before the assessment deadline. 1 achieved their final model state in week 3; 9 in week 5; 7 in week 7; 12 in week 9 (recall that only 1 student did not achieve a (near) expert model). Some preferred to answer many questions in a few sittings, reading and revising material at the time (some early in the course, some more evenly throughout). Others preferred to use OLMlets more frequently, for shorter periods. In this case a similar pattern was observed, where some completed their model relatively early, and some worked more evenly through the term. The mean and median questions attempted (Table 3) suggest that the third logging in the fewest number of times required fewer questions to demonstrate good knowledge; but the middle third and third logging in most frequently did not differ much in the number of questions required. The number of logins was not related to the week by which students completed their model.

Once peer models are enabled, they remain visible until the student hides them or logs out. Thus the figures in Table 3 for enabling viewing of the models of peers (where each asterisk represents a student), apply to a complete session - this is logged only once, although there may have been multiple viewings of peer models within a session. It is assumed that if peer models were never enabled, students had no interest in them. If they were enabled once only, this may have been out of curiosity or in order to determine their potential utility. However, the lack of subsequent viewing in later interactions also indicates a lack of interest in peer models. (All students initially logged in at the same time, and all had some peer models available on their first access.) There was a tendency for those who logged in more frequently, to more frequently view peer models. This applied especially to those whose interactions were spread most evenly through the term.

Figure 4 gives questionnaire results for viewing peer models and releasing one's own model according to relative ability and friendship. Around 60% were viewing the models available to them, of those they believed to have stronger knowledge than themselves, and those they thought were at a similar level. Only 16% were interested in the models of users they considered weaker than themselves. Their friends' models, regardless of ability, were accessed as frequently as those of the stronger and similar students. While many opened their model to all peers, the questionnaire sought to determine the extent to which users specifically considered those to release their model to, even if they eventually opened to all. A similar, but less extreme pattern was found for releasing the model, with 72-80% considering it useful to open their model to friends and those they believed to be at a higher or similar level to themselves; and 52% to those they considered weaker.

Figure 5 shows the way in which students used peer models in collaborative and competitive learning. Around half stated they were using the peer models available to them competitively - i.e. to try to outperform other students. Almost as many used them collaboratively, discussing their models with each other. 5 (20%) used the peer models to actively seek collaborators or helpers.

The following excerpts are from student descriptions of the utility of the peer models.

Releasing the learner model

- I felt it would be useful, from the beginning, to allow everyone anonymous access to my model, in order to provide comparison models for other users. I felt this was fair, as I was expecting other people to do the same so I could compare myself against theirs.
- The reason I decided I was going to show my personal details is to hopefully encourage more communication within the group.
- I opened my learner model to my peers anonymously as I didn't want to be asked for help.
- I decided to open my learner model to all my peers and instructors…to get myself recognized.
- I decided against opening my model to peers as I did on occasion discuss my current level with my peers out of lectures as a gauge for how far they had got to judge how far along I should be.
- I felt if I restricted my model from certain people it may be assumed I had issues or grudges with them.

Individual use of peer models

- Allowing me to see if I was progressing at the same, further or behind my peers allowed me to think about my work patterns, and was I doing enough?
- I also used it to examine what misconceptions were held by other people to avoid holding those misconceptions myself.
- I was continually comparing my learner model to my peers to see if they were experiencing any similar misconceptions or problematic areas or whether they were individual to me.

Collaborative use of peer models

- By having this knowledge of other students it allowed me to ask for peer help, in trying to overcome my misconceptions and help those with different misconceptions that I knew about.
- I do not think studying should necessarily be a private thing. Several peers approached me to exchange ideas and useful papers seeing that I had been frequenting OLMlets!
- Another important aspect of opening a named model was that I was receiving responses from my peers. They would come up to me and point out that they were having difficulties in the same topics as me and one student even helped me to resolve these issues.

Competitive use of peer models

- I saw my knowledge increase… I became more competitive. I no longer just wanted to meet the weekly target. I wanted to race ahead of the weekly target and also my peers.
- In a way it was almost like competing for the top position.

Non-use of peer models

- Whether other people have achieved some specific level does not affect my own target at all. Sometimes I may have different schedules from others, in other words, I may pay different amounts of attention at different times to different modules.
- I largely chose not to observe other people's learner models. From an early point I felt I wished to keep the momentum in my learning more self-motivated rather than peer-motivated.

3.3 Group Interaction

The following description provides an insight from the students' perspective, of the kinds of interaction amongst the group that were prompted by peer models. This is based on the experiences of the second author, a student on the course who was therefore in a good position to summarise what was happening amongst the students, to supplement information from the questionnaires and logs.

When OLMlets was first used in the set lab session there was not much discussion. Initially progress was measured against the expected level of knowledge, with the general focus of any conversation being whether a student was ahead or behind the expected levels. After it was announced in a lecture that the instructor had seen the first completed model from those available to her, there was an immediate increase in the level of discussion and competitiveness. Regular discussions involved people who had mentioned that they had a complete model, who were willing to explain points to others. As more people completed their learner models, the general feeling of the remaining students was to complete their own model, as it was an assessed item that carried a 10% weighting, and was 'a silly 10% not to gain'. As the weeks progressed, there was also a lot more quiet competition. This was partly a race against time, but it was also comparative to other users. This occurred not only amongst students who had not yet completed as much; it also arose amongst those who were ahead, comparing themselves against fellow students in a 'bout of superiority' (knowing they had completed part of the assessment, and had finished ahead of others).

At the start some students kept to the expected levels as they thought that exceeding them may be disapproved of, and may jeopardise their OLMlets mark. As the course progressed and more people completed their model ahead of time, more of those who originally aimed to stick to the schedule also completed their models. However, there were still a few who were careful to finish the topics in line with expectations. For some this was because they were also working on the main assignment and following the guidelines as advice for the rate to proceed; but for others it seemed to be a fear of being penalised in the assessment for not interacting with the system 'correctly'.

When several people were using OLMlets at the same time, most notably in one of the small computer rooms, there came to be almost a community feel. Students were comparing their model against those of people in the room, and discussions were occurring spontaneously all the time.

The main difference between this course and others was in the amount of interaction amongst students. This was not only about the extent of completion of the learner model, but also about the course content as students were aware of their relative strengths and weaknesses, and were keen to help each other understand problematic points. The aim was often to improve the learner model, but students had to learn to accomplish this, and they recognised that they were learning. Discussions were taking place even amongst students who do not usually talk to each other about work.

3.4 Discussion

It is difficult to be sure of the extent to which high usage levels (measured by the number of questions attempted) is due to students' interest in educational technology, and to what extent it results from the fact that the learner model formed part of the assessment. An advantage of formally assessing the model is that *all* students interact with the system, and so more may use it also for formative assessment. However, previous work found that, when OLMlets is recommended as *preparation* for an assessment in courses where students had no particular interest in user modelling or educational technology, usage levels can also increase [5]. It appears likely, therefore, that if students are made aware of the potential benefits and how it relates to assessment (even if the learner models themselves are not assessed), the benefits of prompting reflection on learning either individually or collaboratively, may be achieved. The fact that OLMlets is an *open* learner model means that students can judge when to stop working, and nearly all students in this study strove to achieve a perfect model. The excellent results were not only relevant to the OLMlets assessment, but crucially also ensured students had a good understanding of key issues for their coursework, increasing the likelihood that they would achieve the intended learning outcomes of the course.

While all students found their own model useful, and most found the expectations comparison helpful, students had different reactions to the group and individual peer models. It is not expected that everyone should want to work collaboratively or competitively with OLMs - individual use of one's own model may better suit some. The ability to view peer models is therefore included *for those who find it helpful*. As over half claimed to find it useful, we recommend inclusion of this feature. Students found named models more useful than anonymous ones. Further work will help identify whether this was a feature of this student group, or whether high usage related to assessment, or the effect of use alongside a complete course, led to greater interest in knowing the owner of a model (for example, to help identify suitable learning partners; to set personal targets according to what similar students are achieving; or to avoid models considered unlikely to be useful).

By the end of the course, 23 of the 29 students had released their model, most named, and all but one of these opening to all peers. In all cases all parts of the model were released. At the start of the course, 11 students opened their model to peers immediately, with all but one of these opening the full model, and all but two opening to all peers. This included a mixture of strong and weak models (according to expectations for the stage of the course), indicating that some were happy to release a weak model. This may help reassure students who are having difficulties, that others are in a similar position (see [4]). Models were released both named and anonymously, this choice not necessarily related to the strength of the model. During the course more students released their models, with the proportion of named models growing. Often, models released later were released once they were strong. Thus, at the start users saw a mix of models, and as the number of available models grew, so did the proportion of strong models. If these patterns turn out to be consistent over a range of courses, when using OLMlets in several courses students may be able to interpret the progress of others by the release rate of models. However, if usage patterns differ across courses, more work will need to be directed towards determining how students can appreciate the knowledge of their peers in particular if they are choosing not to use the group distribution view.

Those who used OLMlets in fewer sessions, were quite evenly split in terms of whether they chose to view peer models. Those logging in more frequently tended to view peer models quite frequently throughout, suggesting that interest in peer models (for those who chose to use them), was maintained over time. It is interesting that the group logging in less frequently had a higher proportion of users who were not interested in peer models. Further work could investigate whether these students were working less frequently for extended periods in order to complete the work in as few sittings as possible and, perhaps for this reason, did not wish to 'waste' time viewing the models of peers; or whether the fact that these students required fewer questions to achieve their final learner model state also meant that there was less need for comparison to peer models.

Students were generally more interested in the learner models of those they considered stronger or of a similar ability to themselves, suggesting that they were focussing on improvement and comparing themselves to people they expected to be doing at least as well as themselves. They were perhaps also more concerned with seeking help from more advanced students, than offering unsolicited help. Students were also interested in the learner models of their friends, probably because they would normally be more likely to discuss their learning with friends, and also out of general interest for their friends. Students were interested in both discussing their model with others, and in using peer models competitively, as a measure against which to aim. Furthermore, despite existing groupings of friends amongst the students, 20% still used the peer models to seek out collaborators or helpers. Thus the availability of peer models can be recommended for each of these purposes, assuming these are appropriate for the context of system use. As stated above, it is not expected that all students should be willing to open their model to others, or that they should all want to view peer models. The important issue is that sufficient students were happy to release their learner model to other users, for the approach to be successful for those who found it helpful.

The excerpts from student explanations of how they used peer models are illustrative of the main comments received. The results have already shown that most students chose to open their learner model to their peers. A sense of 'fairness' was sometimes expressed to explain this. Some students hoped to encourage collaboration amongst the group by releasing a named learner model. Others who were not interested in working with peers did nevertheless open their model to peers, though sometimes anonymously to ensure that they did not receive communications from others. However, a few students preferred not to release their model - though some of these did still discuss their model with peers. Common reasons for using peer models include the ability to see whether one is on track, and to try to avoid specific problems that others might have. Some students were more interested in using the models competitively, to try to outperform their peers, or more overtly to gain recognition. In contrast, some found that the models of others did not affect their own learning, as they followed their personal schedules. In one case a student was concerned that withholding their learner model could be seen as reflecting a (negative) perception of others, and so felt some pressure to release it. Clearly it is a problem if a system designed to allow optional release of the learner model to suit the individual's preference, results in a student nevertheless feeling some kind of obligation to release their model. There was only one such case, and many more positive experiences reported, but this is an issue that should be further considered.

Overall, most students were happy to open their learner model to others, even if they did not use peer models themselves; and around half found peer models useful, suggesting the value of providing this facility. According to comments from several students, a major effect of the widespread availability of peer models appears to be a generally increased level of communication about the course content amongst the group, which applied also to some learners who chose not to release their own model; and an increase in competition amongst competitive learners which, in turn, also spurred many others on to work earlier in the course than they might otherwise have done.

The instructor expectations comparison appeared to be the most common method of measuring progress at the start of the course. However, as the course progressed and students noted that some were working ahead of schedule, as stated above, this appeared to motivate many others to do likewise. Thus, later in the course, many students may have been using the expectations comparison in conjunction with the peer models as a target that they wished to exceed, rather than as the intended guideline for progression. A benefit of this was that students were *more* knowledgeable about the course content at each stage of the course, than in previous years. However, a question has been raised about a few students believing that they should perhaps not exceed the weekly targets as this may negatively affect their assessment. It is unclear how this belief may have taken hold, but highlighting to students that the targets can be exceeded, may be sufficient to address this.

Spontaneous collaboration occurred particularly on occasions when students were working on OLMlets at the same time in the same lab, against a background of a 'community feel'. Such synchronised working was likely to have occurred because students had similar timetables, and so were at the same time filling in gaps between lectures, with lab activities. If students are following different timetables it may not be so easy to obtain the levels of peer interaction observed here, and in such cases it may be helpful to schedule dedicated lab sessions if this is possible.

It appears that there were greater levels of discussion of this course than typically occurred in other courses, prompted in large part by the high availability of peer models. Although students were often focussing on completing their learner model in order to complete their assessment, this necessarily involved further learning, and students did appear to be aware of this development of

their knowledge. The key question arising from this study is whether the willingness to open one's learner model to peers will extend readily to other contexts, in particular in courses where students do not have a specific interest in educational technology, and in courses where the learner model does not form part of the assessment. Advising students of the relevance of a system as assessment preparation may be helpful (see [5]); and simply mentioning student progress in lectures can have a strong effect on prompting system use. Both these measures can be employed easily in most courses. Similarly, stating that targets may be exceeded if students wish to work ahead of the expectations comparison should remove the problem of students believing that to do this may constitute 'incorrect' use of the system. Providing time during a lab session to ensure that students have the confidence to use the system and are aware of the facility to view peer models and release their own model to others (and that they may remain anonymous in doing this if they prefer), may be important in later achieving the level of interaction amongst course members that occurred in this course. Instructor enthusiasm may help to prompt such exploration of peer models initially, though this level of encouragement appears less important to ensure general use (students used the previous version of OLMlets (without peer models) in courses in which the URL only was given, simply with the recommendation that it would be useful preparation for an upcoming assessment [5]).

In conclusion, it appears that achieving high usage levels (which could be facilitated as suggested above), may have two main benefits arising from peer models: (i) increasing discussion amongst students; (ii) increasing competition amongst competitive learners, which then spreads to others, resulting in students generally working earlier in a course than they might otherwise do.

4 Summary

This paper has described the use of learner models that can be opened to peers in a course where the learner model was assessed. Most students chose to release their model to others, with the majority releasing it in named form. While many students found peer models useful, we do not expect that all will prefer to use peer models. Nevertheless, most models were made available to others so that those who found them helpful, could use them. A result of the availability of peer models was an increased level of competition and communication amongst students. We therefore propose that, in contexts where collaboration and/or competitive learning is appropriate, students are provided the facility to release their learner model to others, and encouraged to explore this.

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