Analysing online discussions in educational and work based settings

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Abstract

Networked learning is becoming more and more about connectivity of learners or professionals and connectivity to resources available online and sometimes freely. Researchers are making use of these by designing online environments where this notion of connectivity and vast resources available to learners can be exploited. Many online discussion tools are available for use in educational settings. This paper discusses means of comparing the quality of interaction in these tools. We focus on the use of an online discussion tool called InterLoc (http://www.interloc.org.uk/). InterLoc is based on research by McAlister (2004) who designed a tool for online peer discussion that guides students' dialogue towards more academic interactions and facilitates extended argument. A significant feature of the design of the tool is managed synchronous dialogue e.g. the use of sentence openers, and the facility to reply to earlier contributions. The design features of InterLoc ensure that it provides a collaborative argumentation environment for learners in higher education. We also demonstrate that it is possible to structure argumentation using InterLoc in different settings, both academic and workplace. One of our case studies was carried out with postgraduate distance learning students studying science communication and the participants were asked to consider the idea that everyone's DNA should be kept on a data base to help fight crime. The second case study was in a health and social care setting and the participants were family-support workers of a London based charity, supporting families and individuals offering practical, emotional and financial help. They were asked to consider the case of a severely obese child whom social services are considering taking into care as the parents are unable to control his eating. The participants discussed what would be the best for the child. We used two methods of comparing the quality of interaction in these sessions: We analysed the transcripts of discussion sessions using content analysis and frequency of sentence openers and compared these analyses with those using Toulmin's Argumentation Pattern (TAP). By comparing the results of these two analyses, we explored the possibility of using these measures as an indicator of the quality of the discussion taking place. Our findings have confirmed the potential of the InterLoc sentence opener analyses for future work.

Introduction

Reviewing the networked learning Manifesto published in 2002, Beaty, Cousin and Hodgson claim that it is necessary to foreground connectivity and the co-production of knowledge as specific and important pedagogical features of networked learning as well as 'e-quality' of opportunity (2010; p.185). The co-construction/production of knowledge through dialogue and critical pedagogy (again with its emphasis on dialogue) have contributed to shaping of networked learning as a distinct academic area. Networked learning also employs social constructivism and demands critical reflectivity and taking responsibility for own and others' learning in the network (Beaty et al., 2010). Within this enhanced understanding of networked learning we investigate a case of use of an online discussion tool in both an educational setting and a work-based setting.

As well as many other aspects of education, the advance of technology is influencing the research in dialogue and pedagogy. As a result, tools that support the use of dialogue in online teaching and learning settings and facilitate fruitful online argumentation have begun to be used even in face to face teaching institutions. These learning environments focus on discussion, knowledge sharing and knowledge building (see Scardamalia, Bereiter and Lamon, 1994) . In addition, general purpose asynchronous threaded forums have also been successfully used to support classroom discourse (Jones et al, 2000; Collison, Elbaum, Haavind and Tinker,

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2000; Salmon, 2000). These forums connect and enable students to share ideas/resources, give and receive feedback and work together to build knowledge.

In this paper we present findings from a study investigating the interactions and experiences for distance education students and charity workers using an online argumentation tool. Our aim is to provide a practical way to assess the quality of online discussions. The work presented here is part of a wider project exploring digital dialogue games with a range of learners and contexts where the tool has been used and evaluated (see Ravenscroft et al., 2010).

Online argumentation and InterLoc design features

"Learning to argue" is not easy and requires learners to focus on the discussion topic, to bring in relevant knowledge, to listen to others' views and reflect and reply to them. Electronic chat, due to its synchronous and interactive features may help improving argumentation and reasoning skills (Pilkington and Walker, 2003). In addition, in an online environment, such as InterLoc, learners can access a variety of learning resources available on the web or resources can be provided selectively for them. These environments can be structured and managed towards the specific aims of the pedagogical activity. Finally, the resulting 'discussion can be re-produced in multiple formats and media for easy access later.

InterLoc (see McAlister, Scanlon and Ravenscroft, 2004) is a tool designed to support collaborative argumentation and provides an environment for online discussion. It is based on the research by McAlister (2004) and includes a mediating interface with sentence openers to structure interactions. The design features of InterLoc ensure that it provides a collaborative argumentation environment for learners in higher education and also other contexts. InterLoc has been developed through a cycle of evaluations that took place during different phases of a number of JISC funded projects (Ravenscroft, 2007). Most recently the University of East London have funded further development in 2012/3 in the Learning Enhancement Opportunities programme (LEO) in a project titled 'Promoting inclusive critical thinking. Ongoing adaptation and development is also being supported as part of the EU FP7 Integrated Project - MATURE which is investigating 'Continuous Social Learning in Knowledge Networks' (see http://www.interloc.org.uk).
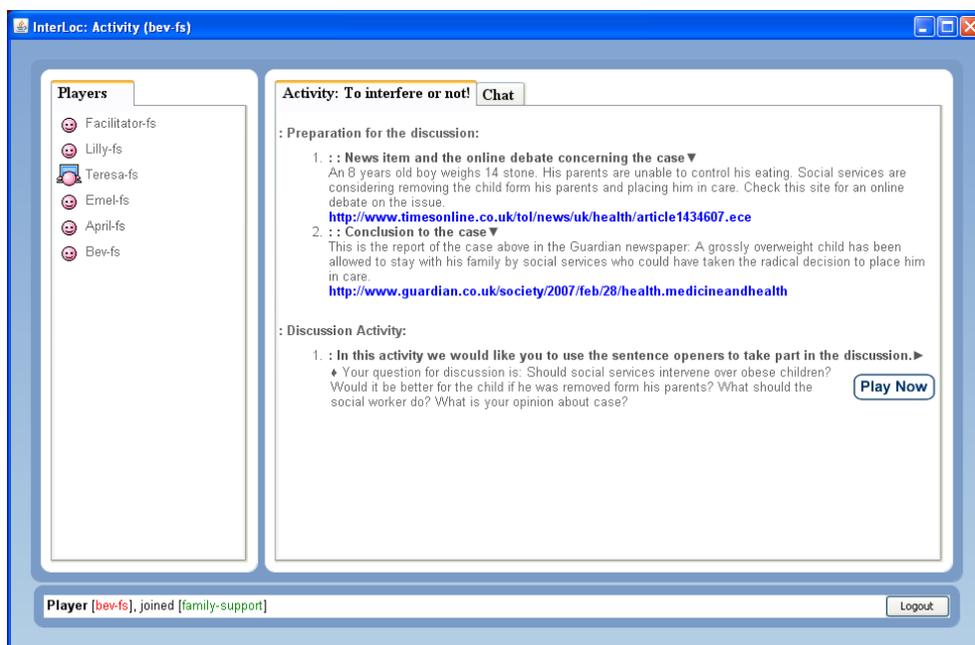

Figure 1. The initial screen of InterLoc.

InterLoc uses web 2.0 features and after logging in participants can see the status of their fellow participants, the activity window with preparation resources and the task (see Figure 1). Discussion takes place in a Conversation window called the 'Dialogue Area' and participants can write their contributions in the lower part of the screen, reply to any other contribution and also have an informal chat in the chat area, if they need to communicate informally about anything else during their collaborative discussion (see Figure 2).

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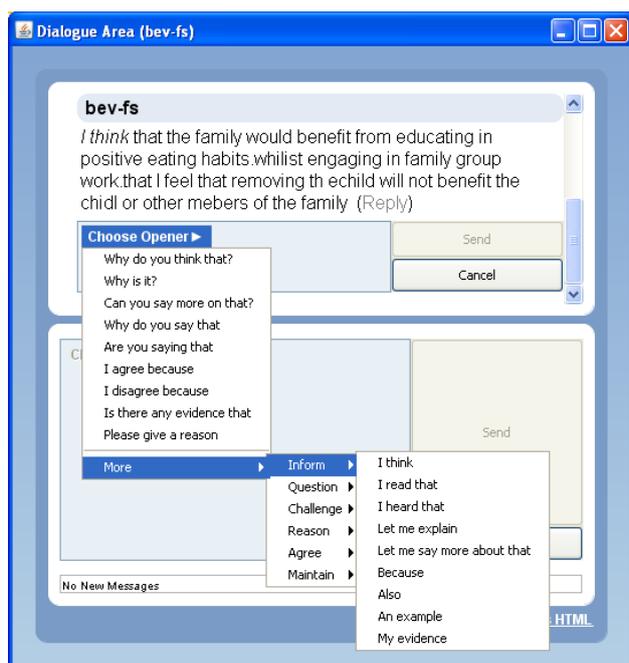
Sentence openers are an important feature of InterLoc. All contributions are made using one of the sentence openers (e.g. I think, Let me elaborate, I disagree because,) provided in six move categories (e.g. Inform, Question, Challenge, Agree, Reason, Maintain; See Figure 2).

Case studies

We selected two case studies from our trials with the InterLoc tool to compare online discussion sessions and used two different analyses with the aim of providing a practical way to assess the quality of online discussions. Each session had a variety of online resources in the form of web pages, newspaper reports and associated forums and links to blogs of experts. For all case studies, volunteers were asked to take part in the activity and were sent instructions about how to join the discussion groups, practice the tool beforehand and browse the resources provided.

Figure 2. Sentence openers in InterLoc.

The sessions were scheduled for about an hour. All the participants came online at a specific time, and spent about five minutes setting up and saying hello (ice breaking). Then they were asked to start the discussion by the facilitator who did not take part in the discussions. Ten minutes before the end of the session participants were asked to bring the discussion to a close. The study was followed up by an email questionnaire to the participants after the session which consisted of a demographic section and an experience with online and social networking tools section. None of the sessions were formally assessed as part of the course work for students or training for Family Action workers.

Case Study 1: National DNA Database

Participants for this case study were postgraduate students studying 'Communicating Science' at the Open University, UK. The aim of this course is to consider how science can be communicated in different settings and one of the skills the course helps students to acquire is to communicate scientific ideas to a variety of audiences (See Holliman and Scanlon, 2006). There were five participants in the session and students were asked to consider the following question:

DNA is not like a finger print, it is actually a batch of your genetic code and currently around 4 million people have their DNA permanently retained on the National DNA Database. Some argue that everyone's DNA should be kept on a database to help fight crime, do you agree?

The participants in the group, two males, three females, were all geographically distributed and joined the session from home. They are adult students all over the age of 35, mostly work in education as science teachers or in a related occupation. The students did not seem to know each other from their initial greetings and we did not ask a specific question regarding their familiarity with the fellow discussants.

Case Study 2: Family Action

This case study was in a health and social care setting. The participants were family-support workers in a London charity, supporting families offering practical, emotional and financial help to families and individuals in their communities. Five participants took part in the online activity, all female, all over 35 years old and they used InterLoc with their fellow workers in their usual workplace in two different rooms at their normal work stations.

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The activity was an informal discussion for these participants and they used part of their weekly discussion session to discuss a topic related to their work using InterLoc. In this case study participants were asked to consider the following case:

An 8 years old boy weighs 14 stone. His parents are unable to control his eating. Social services are considering removing the child form his parents and placing him in care. Should social services intervene over obese children? Would it be better for the child if he was removed from his parents? What should the social worker do? What is your opinion about this case?

Analysis

Two types of analyses were carried out on the dialogues produced during the synchronous InterLoc sessions, also called transcripts. The first analysis involved using the frequency of sentence openers selected by the participants and exploring the distribution of contributions to each category of move. In addition we employed a simple content analysis of contributions to understand the nature of the discussion and the interaction. The analysis included examining the number of contributions made to a discussion, as well as the nature and frequency of moves (sentence openers used to start the contribution). The sentence openers were categorised under the six categories used in InterLoc:

- Inform (e.g. I read that…)
- Challenge (e.g. I disagree because…)
- Question (e.g. Can you say more on that?)
- Agree (e.g. I agree…)
- Reason (e.g. That is valid if…)
- Maintain (e.g. Good point …)

For our second analysis we used Toulmin's Argument Pattern (TAP) (Toulmin, 1958) and employed a similar method to that proposed by Erduran et al. (2004) to trace argumentation in the whole discussion transcript. TAP illustrates the structure of argument in terms of claim, data that support the claim, warrants that provide a link between the data and claim, backings that strengthen the warrants and rebuttals that point to the circumstances under which the claim would not hold true, and so it is widely used as a framework for defining argument (Erduran et al., 2004). Toulmin's approach has been used for online systems such as Belvédère (Suthers et al., 1997) , for asynchronous discussion boards (Stegmann et al, 2004) and used to describe small-group discussions for science learners by Jimenez-Aleixandre, Rodriguez and Duschl (2000) who applied Toulmin's model (e.g., data, warrants, and qualifiers) to identify instances when students attempt to support their ideas during small group and whole class discussions. We coded sections of the transcript that could be recognized as claim, data, warrant, and rebuttal. We then counted the occurrences of these in the whole of the transcript. A reliability check was conducted by independently coding the same transcript which gave a 73% initial level of agreement which rose to 90% after the differences in coding were discussed and mostly resolved.
For example:
I think obesity and deprivation are linked. [claim]
I agree that the outcome for the child may not be better when in care,[claim] *in fact research shows that it is usually worse.* [data]

Findings

Participants in case study on National DNA database made a total of 54 unique contributions. They considered the issues carefully in a balanced discussion. The main topics of the discussion were: Implications/requirements for international travel; Possibility of miscarriages of justice/robustness of technology; Insurance and other companies using database without individuals' information; Control of the database/security; Ethical issues. The exchange presented in Table 1 illustrates how the discussion took place. Participant 1 brings the issue of insurance companies and others that may have access to a national database and the possibility of misuse. Participant 2 agrees and airs his concerns about keeping control of the genetic information. Participant 3 brings a political aspect to the discussion and questions the value of a DNA database in such a climate. Participant 1, this time replies to her and states that the only use would be identifying some serious medical conditions. In her reply, Participant 3 asks why this information had to be in a data base rather than kept as personal information. The discussion continues on the effect of politics on this issue.

Table 1. Extract from National DNA Database discussion.

Participant 1
I think Such a database could also be abused by insurance companies, and…well we do not know who else will have access to this national database.

Participant 2

I agree because I have real concerns re health care, insurance etc once your genetic information is in the public domain, it will be very difficult to keep control over it.

Participant 3

But we can't trust that the government now, even if they put strict controls in place, would still be the same gov with the same values in the future. What benefits would a DNA database bring though?

Participant 1

I think it's only use will be to identify those susceptible to certain serious medical conditions that have a genetic basis.

Participant 3

Please give a reason why this could not be kept as personal information - why does it need to be on a database?

Participant 2

I agree because being someone who's bank and private details were dispatched on 2 CD-Roms by post along with 28 million others who will be the guardian of this database. Can we trust transient politicians.

Participant 3

I think is true - why I mentioned about changing governments too. A ruling now may not be maintained in the future. Do you think it requires a non-governmental body to police it?

Participant 2

I think that politics so pervades every aspect of society that is anyone really independent today. The only true guardian should be the owner of the DNA i.e the individual unless their actions e.g conviction etc precludes them for this for a specific period of time.

When we look at the distribution of use of sentence openers we see that most of the contributions fall in to the Inform category. The next big category is Agree; and Question and Challenge categories together also make up an equally frequent category. (We decided to combine Question and Challenge categories as some openers were too close in meaning; e.g. 'Why do you say that' (C) versus 'Where did you hear that' (Q)). In summary this shows that participants had a balanced, considered discussion and shared relevant ideas. The distribution of contributions is presented in Table 2. In their questionnaire responses participants in this case study were positive about InterLoc and the use of sentence openers. Most students stated that they could see how using sentence openers would help them to reflect on what they were saying.

Table 2. Frequency of sentence openers for National DNA Database discussion.

Sentence openers categories	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Total	% of Total
Inform +Question	7+1	5+3	3+2	5+0	1+1	21+4	39+7%
Challenge	1	3	3			7	13%
Reason			3			3	6%
Agree	3	4	3	1		11	20%
Maintain	3	1	2		2	8	15%
Total	15	13	16	6	4	54	100%

In the second case study, there were a total of 87 unique contributions and the analyses of the transcript of the participants' contributions revealed that the main points of discussion were around the following themes: The consequences of taking the child into care; Educating families; Financial aspects of the situation; Social aspects/role models.

Table 3. Frequency of sentence openers by participants in Family Action discussion.

Sentence opener categories	Participant S	Participant E	Participant M	Participant H	Participant B	Total	% of Total
Inform+Question	3+4	2+2	5+4	3+0	13+0	26+10	30+12%
Challenge	2	3	1	3		9	10%

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Reason	5	1	1		1	8	9%
Agree	12	6	6	3	2	29	33%
Maintain	1	2	2		1	5	6%
Total	27	16	18	9	17	87	100%

As we have seen in the other case study, the most used sentence openers are in the Inform and Agree categories. In addition, the numbers in the Question and Challenge categories together also make a substantial category. This group used all categories but the least used ones were Reason and Maintain categories. The transcript extract in Table 4 indicates that participants shared ideas and built onto the contributions of others.

Table 4. Extract from Family Action discussion.

Participant B

I think that the family would benefit from educating in positive eating habits. whilst engaging in family group work. that why feel that removing the child will not benefit the child or other members of the family

Participant S

I agree because education is what is needed for all members of the family as it is unlikely that the problem is only confined to that child

Participant M

Also there can be more specialist help such as clinics specialised in working with obese children, maybe a residential environment

Participant S

Good point

Participant S

I think that the idea of a residential environment for the whole family could be helpful, though probably very expensive, and might be able to deal with diet as well as underlying issues

In this extract participants are discussing how education for the boy and the family will benefit them and what should be the nature of this education. They are aware of the initial cost of this approach but still think that it is necessary. In the post session questionnaire, participants in this discussion stated that they enjoyed the experience and thought that they could have carried on discussing this subject longer and use the tool in other discussions. This is even more surprising as these participants had not used InterLoc or a similar system before and they were among less experienced users in terms of their ICT literacy. Still the discussion was engaging for them, possibly because it is a new environment for them and they valued the experience. This is indicated by the balanced use of sentence openers and contribution by all participants.

TAP analyses and comparison of case studies

To be able to propose that InterLoc sentence openers are an indicator of quality of discussion we examined the distribution in the two case studies. As an additional analysis we also categorized the contributions in the case study transcripts according to Toulmin's Argument Pattern (TAP), i.e. we labelled the contributions as claim, data, warrant, rebuttal and backing and counted the occurrences. Table 5 presents the data for TAP analyses with the combined category of Data+Warrant+Backing. We combined these three categories (as used by Erduran et al., 2004) because they are difficult to differentiate but also, they are all 'grounds' to substantiate a claim. Figure 3 presents a visual comparison of the percentages of InterLoc sentence openers and TAP categories for each case study side by side.

Table 5. Frequency of TAP analysis categories for case studies.

TAP categories	Claim	Rebuttal	Data+Warrant+Backing
DNA database study	18	9	15
Family Action study	29	11	29

In Figure 3 the pie charts show that the National DNA database discussion has a bigger proportion of Inform moves (39 %, chart a) and the Question + Challenge category is bigger in Family Action (chart c). The Reason+Agree category is also considerably bigger in the Family Action case study. These are the categories that show that participants are questioning each other's' contributions and asking for explanations. In terms of Data + Warrant + Backing (D+W+B) and Rebuttal categories in TAP analyses, Family Action (chart d)

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discussion has a bigger category than National DNA database discussion (chart b): 42 % compared to 36 % of contributions labelled as D+W+B category respectively. The Rebuttal category on the other hand is considerably bigger in the DNA case study (chart b): 21% compared to 16 %.
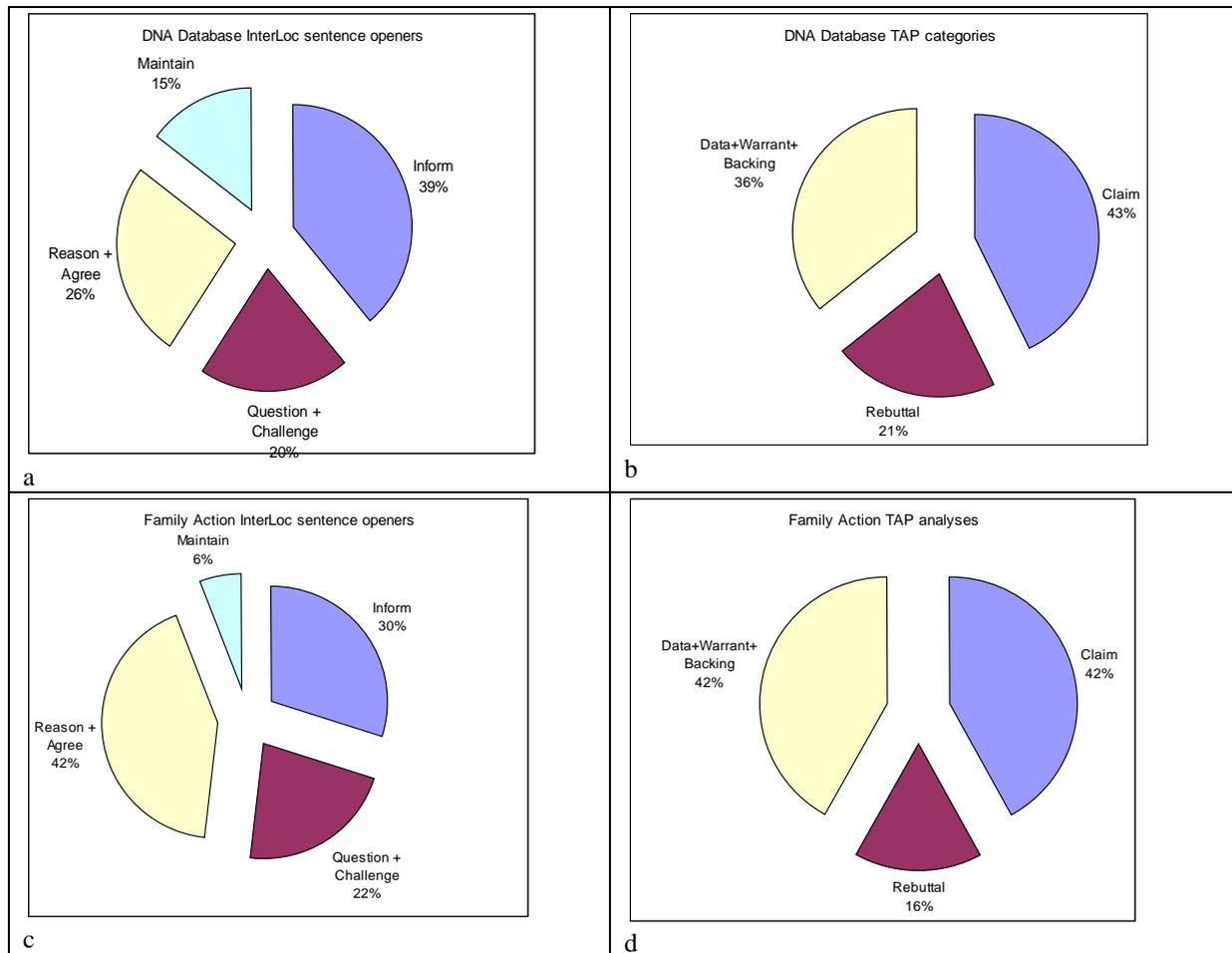

Figure 3. Analyses of InterLoc sentence openers and TAP patterns in two case studies.

In order to test if the distributions of these categories show that these discussions are different from each other in terms of their quality we applied chi-square analysis to both InterLoc sentence openers and TAP categories. The results showed that the DNA database study and Family Action study are not significantly different from each other both in the TAP analysis and InterLoc analysis (see Table 6). This may indicate that both DNA and Family Action discussions are similar and good sessions in terms of quality.

Table 6. Comparison of the case studies using chi-square analysis

Case studies compared	χ^2 analysis on TAP categories	χ^2 analysis on InterLoc Openers
Family Action & DNA Database	$\chi^2=0.703$, df=2, p <0.704	$\chi^2=6.35$, df=3, p <0.096

Discussion and Conclusions

Our conclusion from these findings is that TAP analyses require a slightly more granular analysis to distinguish between similarly good discussions. For example the Family Action and DNA database discussions which are both good quality arguments cannot be distinguished in terms of TAP analysis (p<0.704). However we can say that it is possible to distinguish them on the basis of the use of InterLoc sentence openers within the discussion. Our conclusion is therefore that both types of analysis are a valid way of gaining insight into the quality of

discussions. However, we see the use of InterLoc sentence openers as a practical way to investigate, in detail, good quality discussions. The frequency of use of sentence openers in the observed InterLoc discussions has been shown to be an indicator of richness and engaging nature of the interaction (as shown by parallels with the TAP analyses).We see potential in how these could be used by tutors during or post discussion to help participants reflect on their own contribution and the whole of the discussion. In our future work we will consider the implementation of an online visualization tool and explore further the use of InterLoc as a tool in workplace settings.

This study also illustrated how tools that support argumentation skills can be effective in helping learners gain an understanding of rules of an academic discussion and help them to contribute and share their ideas across a wide range of topics, connect with other learners and resources and construct knowledge collaboratively over a network. The research into networked learning may benefit from emphasizing the role of technology and what kind of affordances new technologies make available in order to better understand the nature of tools like InterLoc (Jones 2012).

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