Interactive Visualizations to Enhance Social Learning Practices in MOOC Platforms

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Abstract: In MOOCs, social learning theory is challenged to perform at scale, but platforms do not have specific functionality which affords scalability. This study examines a design-based research intervention in the learning platform: The Comment Discovery Tool. Results from the initial iteration of this tool suggest positive impact, but further work is suggested to develop MOOC pedagogy in line with novel toolsets.

Introduction

MOOCs typically have a thousand or more enrolled learners. Kizilcec et al. (2013) demonstrate that contribution in forums is strongly linked with 'completing' learners, and suggests that platform designers should build features that promote pro-social behaviour as this encourages learning. Previous research (Tubman, Oztok, & Benachour, 2016) discovered that conversations in the FutureLearn MOOC platform consistently decrease dramatically after the first reply, regardless of course size or subject matter. This suggests that the platform and sociomaterial factors are foundational to the pedagogy of MOOCs. This study re-imagines the social learning features through the design paradigm of 'stigmergy'. Stigmergy is defined as "communication through signs left in the environment" (Dron, 2006; Elliott, 2016). This paper seeks to find answers to the following questions about a bespoke platform intervention: Does the platform intervention have a statistically significant impact on the length and unique members of conversations? Does the platform intervention affect the types of conversations on the platform?

We propose a taxonomy of 'conversation types' based on unique participants: a social dimension based on turn taking and the length attribute of a conversation to quantify the impact of our intervention. Our research extends Chua et al.'s (2017) comment categories from single post onto the whole conversation. This paper analyses the first iteration of a platform design intervention: an interactive 'word cloud' we call 'Comment Discovery Tool' (CDT). The tool functions by visualising all the comments into a 'word cloud', taking the top 200 words used. Learners can click several words which filters comments and redraws the cloud. The intention is that learners will be drawn to words through their implicit meaning. The tool also encourages a sense of 'play' and an appreciation of which concepts 'go together'.

Methodology

This study examines the FutureLearn MOOC platform, which is distinctive in that it follows the Conversational Framework and has a 'comments' thread on each individual page so conversations can be free-flowing around the immediate content. This study takes a mixed-methods, design-based research approach investigating the impact of a platform plugin embedded into 8 out of a total of 35 courses. The results from this study are from the first iteration of the design intervention.

Results

257239 conversations were analysed. An ANOVA analysis showed that the unique learners variable was significant, $F(1, 257239)=496.265$, $p=0.00$, and also that the conversation length variable was significant, $F(1, 257239)=601.703$, $p=0.00$. Cohen's d scores were also calculated for a measurement of impact, and generated a score of 0.15 for unique learners, 0.12 for conversation length. This suggests the CDT has had a small but noticeable impact across the courses in DBR phase 1.

304 people responded fully to a 15-question survey. There was a positive correlation between valuing social interaction and all the questions relating to learning; social learners see the value in the CDT, and are inclined to comment more themselves. These are all important factors in the theoretical understanding of sociocultural learning (discovery, diversity and participation). However, there was a smaller impact in terms of discovery of new people, which may indicate that learners are more inclined to use the tool in order to connect ideas, so for vicarious learning. More experienced learners (who had participated in more than 1 other course) were more inclined to use the CDT multiple times, so familiarity with the platform is correlated with disposition to try out novel approaches.

Table 1: Descriptive statistics

	Courses (n=35)	N	M	SD
Unique Learners	no CDT	225618	1.33	0.80
	CDT	31621	1.46	0.91
Conversation Length	no CDT	225618	1.48	1.43
	CDT	31621	1.67	1.70

Discussion

A DBR approach is taken in this research with a social constructivist theoretical framework. The primary finding is that the intervention does appear to have an impact on the social dimensions, and this is shown both quantitatively and qualitatively, so we believe this meets the challenge by Kizelcic et al. for effective pro-social platform tools. Some learners comments that they were unsure how to use the tool suggesting the scaffolding could be improved to make the affordances more transparent. Others suggested that some words in the CDT were not very meaningful, so didn't add value to the activity. There is another side to this insight: individual words can be computationally operationalised, but it does not change the pedagogy or the culture of participation (Fischer, 2011). A potential development could encourage learners to hashtag their comments so an emergent folksonomy of more specific and meaningful terms can emerge, which follows the 'stigmergic' design principles.

Conclusion

We believe that visualising participation into meaningful units, and according to learner preference adds something new to the pedagogy of scale. We have extended the FutureLearn platform design in terms of visualising 'trends' in the user generated comments and believe that this development could be further improved by embracing hashtags, folksonomies and developing the stigmergic design paradigm. Further research should examine in more depth using an interview methodology what specific impacts the CDT activity is having on learning in order to develop and embed it more effectively into pedagogy suited for MOOCs.

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