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Crowdsourcing content creation in the classroom

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Abstract The recent growth in crowdsourcing technologies offers a new way of envisioning student involvement in the classroom. This article describes a participatory action research approach to combining crowdsourced content creation with the student as producer model, whereby students' interests are used to drive the identification and creation of educational content. This article first describes how this approach is grounded in cognitive psychology and aligned with contemporary learner-centered approaches to education. A case study is then provided detailing how this conceptual framework was implemented in an undergraduate psychology course on persuasion and influence. Two specific applications of this approach are described, one involving found content—with students identifying, explaining the research basis for, and archiving examples of persuasive content, they discover outside the classroom, in a public blog entitled *Propaganda for Change*—and a second involving content creation—with students producing their own persuasive messages that promote pro-social messages of their choosing. This framework offers a promising contemporary approach to learner-centered education and shifts the burden of education from figuring out how to expose what students know and are interested in into helping them construct relationships between content and their own prior understanding of the world.

Keywords Learned-centered education · Student as producer · Crowdsourcing · Communities of practice · Project-based learning

Introduction

Crowdsourcing on a global scale is one of the most salient phenomena of the last decade. Operating systems (e.g., Linux), collective encyclopedias (e.g., Wikipedia),

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consumer-driven content (e.g., Lego mindstorms), crowdsourced finance (e.g., Zopa) and group-managed sports teams (e.g., Ebbsfleet United FC) all rest on the hypothesis that groups can outperform individuals in a variety of circumstances (Kerr and Tindale 2004; but see Mullen et al. 1991). Can similar approaches be taken in the classroom? They can, but for a variety of reasons, educators may be reluctant to implement them (Ajjan and Hartshorne 2008), even as students use crowdsourcing technologies to enhance their learning experience independently of educators (e.g., http://www.ratemyprofessors.com/). Unfortunately, our ability to evaluate and develop successful approaches to utilizing crowdsourcing and student-empowering technologies in the classroom is limited by our willingness and capacity to implement them. The present work takes the approach of participatory action research (Freire 1982; Whyte 1991), with the goal of implementing crowdsourcing in the classroom.

One of the principle difficulties with developing crowdsourcing in the classroom is that many educators lack knowledge about the possibilities regarding how to bring technology into the classroom. For many university classrooms, the use of technology is still rather pedestrian (Maloney 2007). The growing development of e-learning opportunities, for example, are commonly used as submission portals for assessments, forums for discussing questions, and repositories for providing basic information such as assignments and the syllabus. Nonetheless, many educators have had considerable success using technology to help students contribute to the educational process in ways not previously possible (Alexander 2006; Anderson 2011; Collis and Moonen 2008; Damron and Mott 2005; Graham et al. 2007; Sevian and Robinson 2011; Steinert and Snell 1999). At the same time, increasing numbers of universities are moving to online educational approaches such as massive open online courses (MOOCs). These approaches represent important and valuable contributions to our ongoing understanding of the possibilities of modern education.

Critically, many contemporary educators understand that for education to persist beyond the boundaries of the classroom students must develop an interactive dialogue with information they are learning in ways that concern them directly, consistent with participatory action research and critical pedagogy (Freire 1982; Shor 1996; Whyte 1991). Technology does not have to facilitate this, but it can. A calculator can be used as much to prevent a child from learning what multiplication means as it can be used to facilitate that learning. However, in many cases technology can facilitate educational environments that embody evidence-based approaches to learning (e.g., Sandholtz et al. 1997; Woolf 2010). Specifically, crowdsourcing technologies allow us to further develop this approach by putting students in control of the dialogue.

The aim of this article is to describe a conceptual framework illustrating how crowdsourcing content creation in the classroom embodies principles of learning for which we have evidence and to provide a case study of how this framework was implemented in one classroom. Specifically, the framework described here asks students to do what they should be best suited for—finding places in the world where the things they are interested in embody classroom content. Furthermore, the case study asks students to critique forms of persuasion and influence that are

designed to influence student's behavior—as well as to produce forms of persuasion and influence that can influence the behavior of others.

The reasons for taking this approach are numerous. Educators often want to engage students in ways they appreciate in terms of their daily lives, by helping students to recognize how content is embodied in things with which they are already familiar. Such an approach helps students to initiate a dialogue with the information, learn how to ask questions, and begin to understand and take ownership of their own knowledge—features often associated with learner-centered approaches (Baeten et al. 2010). Crowdsourcing content creation is learner-centered by design because it leverages student knowledge to create an artifact that enlarges the base over which students can recognize how what they are learning has relevance to their lives.

In what follows, first the benefits of crowdsourcing content creation in the classroom will be described from the perspective of both educational and cognitive psychological research. Following that, a case study is provided—the Propaganda for Change Project—which asks students to first find and document, in a blog, content in their environment, and then to produce content in the form of persuasive videos based on their understanding of the underlying content. This work takes the form of participatory action research, but it should provide a grounds for critique and a possible stepping stone for educators interested in understanding how they might best bring this approach to their own classrooms.

Found content: crowdsourcing and the student as producer model

Crowdsourcing content creation focuses students' attention at the boundary between educational content and students' interests. That is, the goal to which students focus their effort is explicitly defined as the task of finding classroom content outside the classroom, or producing similar content, and then explaining how the content and the real-world application are related. In cases where the content is found and explained, this is called *found content*, following the idea of found art (e.g., of Picasso and Duchamp fame; see Margolis 1974). Indeed, it is based on the same principle that by developing an eye for what we hope to find (e.g., art or science content), we can develop the capacity to see how it already exists in the world in which we live. In cases where the content example is produced by students, the goal is to focus students' attention on the kinds of problems and issues to which classroom content contributes. In both cases, the goal is for students to guide their inquiry around content in the world.

This approach stems from the student as producer model, which is a developing approach to education that borrows much from previous literature on learner-centered education, inquiry-based learning, and pedagogies of participation (Neary 2010; Neary and Winn 2009; Lambert 2009; Hordern 2012). Moreover, it embodies these approaches in project-based learning (Blumenfeld et al. 1991). Specifically, in higher education the student as producer model is based on "undergraduate students working in collaboration with academics to create work of social importance that is full of academic content and value" (p. 193, Neary and Winn 2009).

The student as producer and similar approaches based on learner-centered contributions are necessarily juxtaposed against the learning as consumption mythology that has become widespread in our modern classrooms (Halverson 2011). The notion that we live in an increasingly consumer-based culture is not new, but the capacity for computers to reduce students to point-and-click robots in complicated virtual Skinner boxes should not be lost. Students are at risk of being increasingly met with boilerplate environments that are designed to reduce knowledge to its most clickable form. At the same time, many media devices such as cell phones and tablets are primarily designed for consumption, with a high barrier to entry for those hoping to use them for production. The tablet on which this article is currently being written has 40 applications, of which approximately four are for producing content.

Many readers are likely to wonder what is the problem with simply consuming content. Direct instruction has its benefits (Saroyan and Snell 1997) and many students may be familiar with and even comfortable with this format. Nonetheless, there are a number of reasons that support the inclusion of production-oriented education. First, production and consumption present different kinds of problems (Blumenfeld et al. 1991). Consumption environments, as defined here, are closed systems where students make choices amongst a set of pre-defined alternatives. They are the multiple choice version of reality and many of even our most sophisticated approaches to virtual education are examples of this (see Squire 2005). Production oriented environments, on the other hand, are open systems where the possibilities are countably infinite even if they are not entirely unconstrained (Stroup et al. 2005; Blumenfeld et al. 1991).

Second, production environments, as defined here, are learner-centered and accrue the evidence-based benefits routinely found in learner-centered education (Lambert and McCombs 1998). In learner-centered environments, students are not all trying to make the same snowflake. In relationship to found content, students are explicitly asked to bring prior knowledge and idiosyncratic interests to the task. This facilitates a sense of ownership, motivation, and the foundational constructivist principle of embedding content in what the student already knows and is familiar with (Grabinger and Dunlap 1995). Moreover, it directly facilitates the students' capacity to make sense of the world in which they live (Duffy and Cunningham 1996), an idea at the core of constructivist theory (Raskin 2002).

Cognitive psychology and crowdsourcing content creation in the classroom

Though translational research is still in short supply (Roediger 2013), cognitive psychology has made considerable contributions to our understanding of how to facilitate learning in the classroom (Anderson et al. 1996; Bruning et al. 1999; Roediger and Pyc 2012; Pashler et al. 2008; Dunlosky et al. 2013). In this section the aim is to enumerate some of the ways in which crowdsourcing content creation is consistent with both contemporary pedagogical and psychological practice.

Crowdsourcing content creation requires students to look at the world and recognize content. In an important sense, this is a kind of self-imposed testing takes

advantage of what has become known as the *test effect*. Numerous studies have demonstrated that the act of taking a test facilitates the ability to recall information in the future (Rohrer and Pashler 2007; Roediger and Karpicke 2006). Evidence suggests that testing—or active recall in response to a cue—facilitates future recall of that information through a mediation process, whereby the learner learns how to recall information in response to cues by developing more effective mediators (Pyc and Rawson 2010). In other words, in the case of found content, the learner develops the capacity to recall content by discovering pathways by which information in the world is related to information in the classroom. Merely revisiting material does not provide the same learning opportunities and students memories of content suffer accordingly.

Similarly, found content asks students to self-generate cues for the content from information in their day-to-day experience. Self-generated information has been repeatedly shown to be more effectively remembered than information generated by an outside source (Slamecka and Graf 1978; but see, for example Nist and Hogrebe 1987). Moreover, the model of generative learning proposed by Wittrock has been shown to lead to more effective learning outcomes than more passive approaches, for example, via the creation of summaries during reading comprehension (Wittrock 1992): in finding as opposed to reading solutions to mathematical problems (McNamara 1995), and in learning isolated facts by attempting to produce the answer beforehand (deWinstanley 1995). The *generation effect* has also been shown to be especially prevalent when generated content (e.g., questions and explanations) stems from learners' prior knowledge and experience (e.g., King 1994). Having students self-generate content from cues in familiar environments outside the classroom also means that these cues are more likely to be present and encountered when students leave the classroom. If an educator asks students to recognize how IKEA utilizes well-tested persuasion techniques, this is likely to have a very different long-term outcome for students' education than if they discover these for themselves in places they frequent of their own accord.

Found content also requires that students ask themselves how their environment contains explicit examples of content related phenomenon. Further, by having students explain how content is embodied (or not), this asks students to use self-explanation. Both *self-explanation* and *elaborative interrogation* (i.e., asking questions and coming up with possible answers) have been repeatedly shown to facilitate learning and interest in the content (Rittle-Johnson 2006; Woloshyn et al. 1992; Ramsay et al. 2010). Moreover, teaching and explaining to others enhances learning in the individual doing the explaining (Ploetzner et al. 1999). Summarizing content has also been shown to effectively facilitate learning (Dunlosky et al. 2013).

Found and produced content also provide educators with the opportunity to better understand what students understand about content. Educational scholars have long understood that to facilitate expert knowledge educators need to identify student *misconceptions* by making these misconceptions visible (Hestenes et al. 1992). Making misconceptions visible requires that students demonstrate how they use and understand concepts in practice. By providing a means for students to demonstrate their understanding, learner-centered content creation provides educators with ways to identify misconceptions.

In sum, having students produce content shifts the burden of education from figuring out how to expose what students know and are interested in into helping them construct relationships between content and their own prior understanding of the world. Because found content necessarily relies on what is already familiar to the student, it aims to make content-related thinking more of students' everyday practice.

Case study: the propaganda for change project

How do we put crowdsourcing as a conceptual framework into practice? The case study presented here—the Propaganda for Change Project—is provided as one possible answer to this question. It is meant to be taken as a basis for improvement and critique, but follows the design of participatory action research, in which students are "the masters of inquiry into the underlying causes of the events in their world" (Freire 1982, p. 30). The case study was designed to create opportunities for students to benefit from the educational and psychological principles outlined above, but also to provide them with ways to take action with their education and to guide their own inquiry. Specifically, the goals of the Propaganda for Change project were threefold:

1. To engage students with the task of finding examples of classroom content in their daily experience.
2. For student insights about content in the world to be available to other students (i.e., public) and for other students to see these productions as a resource.
3. Finally, for students to create real world content that mattered to them based on the content goals of the classroom.

In particular, the Project was implemented in an undergraduate course of approximately 100 students. Large courses often present problems for learner-centered approaches. Thus, the goals of the project were designed explicitly to scale learner-centered principles to a large classroom.

Found content

Methods

Participants

Participants in the study were 98 students (72 female, mean age = 21) enrolled in an optional third year course in Psychology at the University of Warwick. The course covered material under the heading of 'Persuasion and Influence', the majority of which stemmed from the social and cognitive psychological literature: for example, the principle textbooks used in the course were by Cialdini (2009) and

Pratkanis (2007). Topics covered included group polarization (Myers and Lamm 1976) and the power of authority (Milgram 1963) as well as other research and concepts central to the social psychological literature. This content provides a useful platform for participatory action research, because the principles of persuasion and influence play a significant role in our day-to-day behavior, and especially in the marketing strategies used to influence consumer behavior. The course took place twice a week, with one two-hour lecture and a 1-hour seminar in which students could ask questions and work on group projects.

Procedure

The internet was used as the platform for accomplishing the project goals because it provided a means for making student contributions public. Students were asked to sign up as contributors to a blog (http://persuasion-and-influence.blogspot.co.uk/), and each of the students did so in the first week of the course.

Students were then told that over the 10 week course they would be required to make five blog posts on the website, one every 2 weeks, which would represent 13 % of their final grade. These posts would not be anonymous and they would need to meet certain criteria. The students were told that these criteria would change over the course of the 10 weeks, but they would be informed when changes were made. Two example posts were provided as examples, each meeting the basic criteria for an acceptable contribution. The first two can be found here: http://persuasion-and-influence.blogspot.co.uk/2013/01/this-is-advertisement-in-switzerland.html. Students were informed that these examples met all the basic criteria for the initial posts and that student contributions could include any additional information they found interesting or relevant. Also provided was a brief outline of the relevant material their contribution would need directly on the blog template, such that they would see this information each time they went to create their own contribution. It read as follows:

> (put the ad/mesage here) (state the effect here, in your own words. For example, "This advertisement provides an example of… because… ") (explain research supporting the effect here in three plus or minus one sentences) (cite the research here, using APA style, which is identical to the references in the Pratkanis book.)

Specifically, there were three principle criteria that applied to all of the posts. The first was that they explain the relationship between a persuasive message and course content. The second was that they reference and describe an experiment from the literature that was embodied in the real world example that they provided. The third criterion was that students provide unique content not previously posted by other students. Additional criteria were provided at the beginning of each 2-week period during which the relevant posts could be submitted.

There are two reasons why the special criteria were not provided for each set of blog posts at the beginning of the course. First, this prevents students from doing all of the assignments at one time. Second, this allows the instructor to keep content and student interests appropriately aligned. Learner-centered instruction can go

places that educators may not anticipate (Hills 2007; Norum et al. 1999). Providing assignment criteria on a just-in-time basis allows one to update the process in response to student contributions. In the present case, this allows the instructor to update the criteria to facilitate student interests that develop on the blog and to fill holes in content coverage that could not have been anticipated in advance. In other words, placing the content generation in the hands of students requires a flexible method for updating the guidelines students use to make their contributions. It is, however, recommended that the updating process be built into the course development at the outset, such that students recognize it as a way for them to influence the direction of their learning. At the end of the course, students were invited to provide written feedback about the blogs and the student-produced videos (see below).

Making the blog a resource for students

Three possible objections to blogging are likely to be as follows: (1) Students will not post to blogs, (2) The quality of the posts will be too low, and (3) The students will not read the blog. The first two complaints are not the kinds of complaints typically leveled at obligatory assignments that are associated with performance evaluations. Thus, to remove problems 1 and 2 blog posts were obligatory and influenced the students' final mark.

Because the posts had explicit performance criteria, the posts could be marked as 'above criteria' or 'below criteria'. In previous classrooms, variable levels of above criteria work were explored but it was not clear that this improves performance as much as it increases the amount of time it takes to evaluate it (see also Crisp 2007). More than 95 % of students posted all entries and received full credit for their contributions without any intervention. Above criteria work was also noted and discussed during class, such that those below criteria had appropriate models for improving their work.

The last complaint is potentially more important. If student productions are not read by anyone except the student and the teacher, then the students could turn in the work privately and some potential benefits of crowdsourcing would be lost, as they often are in large classrooms. To avoid this, two different 'motivations' were used to help students see the benefit of reading one another's posts:

1. A portion of the final exam (60 %) was taken directly from the blog. This method has been used elsewhere and provides a strong motivator for students (Sanchez-Elez et al. 2013).
2. Students were not allowed to replicate research examples provided by other students.

In brief, these were sufficient to lead students to read the blog, which they were able to demonstrate via comments, during the class, and at the point of assessment.

When asked how students should prepare for the exam, one answer was to read the blog.

The portion of the final assessment that was taken from the blog was implemented in a straightforward way and students knew about it in advance. The assessment asked students to do exactly what they had been asked to do in the blog. In other words, when shown an object embodying a persuasive message (e.g., an advertisement) the student needed to identify a psychological effect discussed in relation to the course, describe how the effect is embodied in the message, describe an experiment establishing the effect, and state at least one of the authors associated with that research. They could only use a piece of research once and they were shown 20 persuasive messages taken directly from the blog. At the time of the assessment the blog contained approximately 500 posts.

Results

Readers are invited to see how student's blogs evolved over time. The first student post is here (http://persuasion-and-influence.blogspot.co.uk/2013/01/width640-height360-srchttpwww.html) and subsequent posts can be examined in the order in which they were produced. The first five posts contained approximately 180 words each and contained one reference. This was very similar to the example post. Approximately 1 month later the average blog post was 377 words per post with 1.6 references per post.

This development followed from the way students interacted with the blog. Students tend to recognize quality when they see it, and students quickly followed better examples with similar or still better quality work. This included more in depth coverage of the research, inclusion of more research ideas, and improvement in the quality of the descriptions. This behavior is often exhibited in student-led group activities (e.g., Stroup et al. 2005). Social influence typically leads students to mimic one another (even if not explicitly). Such social comparison often improves the overall quality of student work (Huguet et al. 2001) and instructors can additionally point out work that they find notable to further reinforce this.

Social comparison is one feature of the crowdsourcing environment that appeared to be particularly beneficial in helping students do their best work. This is based on the hypothesis that students who better understand the criteria for assignments tend to turn those assignments in earlier (for examples of information propagation, see Goldstone et al. 2013). Students who need more help can take longer. This allows information to be propagated within the group via modeling, but also crowdsources the problem of identifying what is appropriate to model. A 2-week window for submitting posts meant that students who submitted work early often submitted the best examples for the rest to follow. In addition, because students could not reproduce other students' work, students who were likely to need the most help were provided with the widest variety of examples. This is an additional use of crowdsourcing to improve quality, and one that deserves further research to explore the hypotheses on which it is based.

Unfortunately, an additional consequence of the blog was the potential for social homogenization, which can stifle the idiosyncratic interests and creative impulses

that might otherwise lead to students' best insights and more complete content coverage. Students can follow one another's leads for a variety of reasons, both good and bad. Thus, to prevent the negative aspects of homogenization, as the weeks progressed, the criteria for blog posts were adapted in such a way as to keep students interested by providing them with new challenges while simultaneously covering areas where students needed the most help and developing areas where they showed the most interest. Though educators will want to customize their approach to their classroom goals, the criteria used here changed over the course of the 10-week term in the following way:

1. *Weeks 2 and 4:* Provide an example from the real world that embodies content from the literature in persuasion and influence.
2. *Week 6:* Provide an example of a persuasive message that fails and indicate how it could be improved by an example from the literature.
3. *Week 8:* Provide an example of a high-quality advertisement that utilizes one of the templates for high-quality advertisements from (Goldenberg et al. 1999).
4. *Week 10:* Provide an example of an argument (e.g., from a movie or a book or your personal experience) that embodies content in persuasion and influence.

On occasions where students produced below criteria work, they were informed of this and allowed to edit their posts to improve the work. Allowing students to improve their work follows the ideal of promoting mastery goals as opposed to performance goals (Ames 1992). Such improvements were needed for less than 1 % of all posts. Students could amend their posts at any time and many did. On occasions where students replicated material, they were told to add a new example to their post and add additional detail on the experiment. This also rarely happened (<1 % of all posts).

Though no students posted content irrelevant to the course, if this had happened the content could have been easily removed as the instructor has administrative rights over what can remain on the blog. In one case a student posted material that dealt with persuasion associated with contemporary neo-Nazi views. This post also contained a link to a neo-Nazi website. This was dealt with by bringing the post to the class's attention and opening the floor for discussion, letting students know that they have individual veto rights (if not abused) over material they see as inappropriate. They could use these rights at any time and even anonymously by placing a written anonymous request in the instructor's departmental mailbox. For the case of the neo-Nazi content, student's agreed that the post was important—as it debunked aspects of the persuasive message—but that the link should be removed.

Examples of student work

The following two examples were chosen because they reflect the general quality of students' work and demonstrate the utility of student-led content creation. Note that

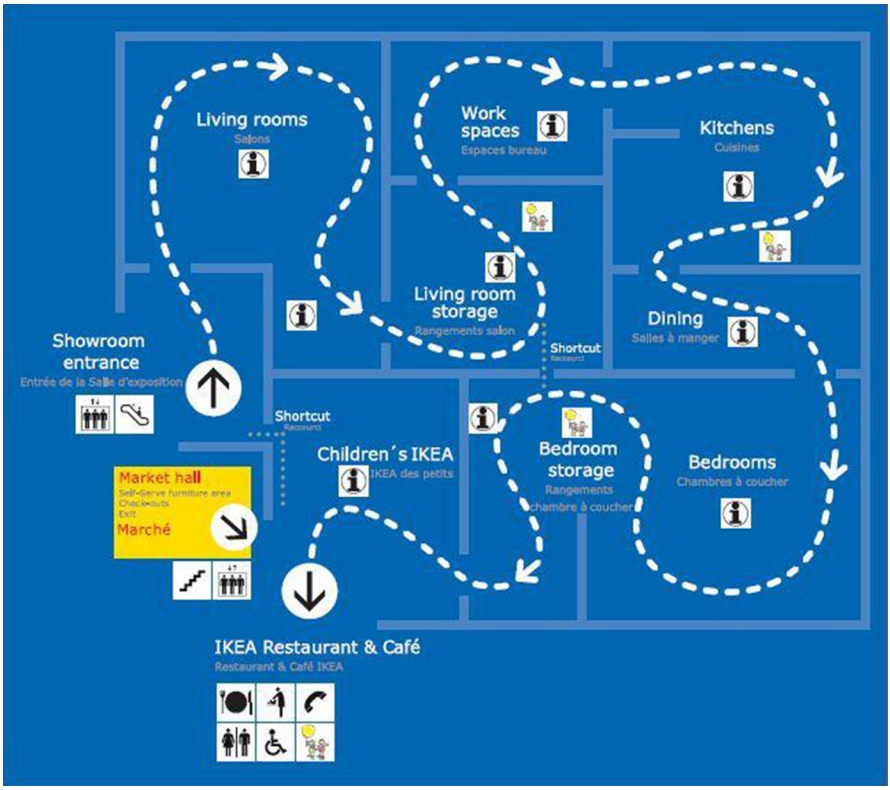
the examples are both likely to be typical of student experience and demonstrate the students' understanding of the content.

Example 1: charity muggers

I was recently accosted by a door-to-door fundraiser and he used some persuasive techniques on me to try and get me to sign up to a monthly direct debit donation to the charity he was representing.

1. *Bandwagon* After briefly telling me a bit about the charity, he told me everyone else on the street liked the work this charity was doing and had signed up. Research on' the bandwagon effect' has shown that by implying that everyone else is doing something, people are more likely to be persuaded to change their behaviour to be more in line with the apparent social norm. For example, in a study by Reingen (1982), participants shown a list of people already complying to a request (e.g., monetary donations) were more likely to also comply than those not shown a list.
2. *Rapport* After this, he asked me lots of questions about myself. Although he may well have been interested in where and what I was studying etc. it is more likely that he was using rapport to persuade me to donate. He then proceeded to tell me he was a student at Coventry. Aune and Basil (1994) found that when solicitors asked for charity donations on a university campus, by adding the phrase' I'm a student too!' to requests, the amount of donations doubled.
3. *Door-in-the-face technique* I told him that I wasn't really in the position to commit to the amount he was asking for on a monthly basis to which he replied' Even 17p a month will help! Surely you can spare that?!' In doing this I think he was using the' door-in-the-face' technique in which a persuader attempts to convince a respondent to comply to a large request which will most likely be turned down. A second, smaller request is then more likely to be complied with as it is seen to be more reasonable. In Cialdini et al.'s (1975) classic study, participants given a large request to start with (asked to chaperone juvenile delinquents for 2 h a week for 2 years) were more likely to comply to a smaller subsequent request (to chaperone them once) than participants given the smaller request to begin with.
4. *Time pressure* Asked if he could give me a leaflet and I could think about it, he told me the charity were trying to cut down on leaflets to save money so I'd have to make a decision now. I believe he was using time pressure to evoke compliance. Research has shown that time pressure can influence the nature of concession making (i.e., make individuals quicker to make concessions) (Stuhlmacher and Champagne 2000) and lead to heuristic processing meaning that decision makers may focus on the present rather than considering the long-term consequences of a particular negotiation (De Dreu 2003).

Example 2: IKEA—Aladdin's Cave (maze)



Ikea may be a market leader in terms of the carefully crafted shopping experience. Almost every part of the experience from layout to product variety is crafted to maximise the desire to purchase.

If 'items for the home' is taken as the over-arching term describing the products for sale, then Ikea offers an almost unreasonable amount, necessitating huge department stores extending over six floors. Simonson (1990) looked at the effect of both variety of product available and amount of product desired on consumer purchase. Participants were asked to imagine they were either purchasing a single item for an occasion on a single day or purchasing several items for occasions over several days. They found that variety significantly increased buying behaviour but only when participants had in mind the notion that they may need several items.

Most people would not go into Ikea for a single item, the floor plan and one way system lift system alone makes this an undesirable notion. At the same time, customers are forced to walk around the entire floor and view all items on offer before exiting. The fact that customers often do not enter Ikea with the idea that they will be buying only a single item, and the huge variety of products on offer, ensures that a trip to the store will be neither quick nor inexpensive.

Furthermore, Ikea offer 'complete apartments for different demographic groups' (Davis 2005, pp. 702). It could be argued that this employs the foot in the door technique, in buying one item you are then more attracted to the overall look for an entire room that can be achieved with further purchase (Freedman and Fraser 1966).

Charity Muggers demonstrates four principles from the class content and summarizes this in relation to a single experience that students in a university environment are likely to encounter often (original post: http://persuasion-and-influence.blogspot.co.uk/2013/03/charity-muggers.html). *IKEA—Aladdin's Cave* outlines one student's perspective of the marketing tactics used by a popular department store, again, common to most students' experiences (original post: http://persuasion-and-influence.blogspot.co.uk/2013/03/ikea-aladdins-cave-maze.html). The power of this approach is not that these examples could not be developed by educators. In some form, they could be. However, as reviewed in the introduction, having students create this content benefits the students in ways that simply delivering the material would not allow. Moreover, the approximately 500 examples provided by students are overwhelmingly insightful, cover a vast number of examples, and are valuable in ways that lecture notes will never be.

Student perceptions of the blog

Forty-seven students provided written feedback about the blog and the videos. Students had overwhelming positive responses to the blog. Some examples include, "A breath of fresh air," "highly applicable to the real world," "the blog posts were a great thing to do," and "The blog is an interesting way to learn about adverts." Two students out of the 47 had negative comments, which both appeared to fall on the same issue. One described the blog as "sporadic" and the other wrote "Blog very hard to read! In a sense that moving from page to page. Too many entries so hard to navigate." Because the blog represents the collection of approximately 98 students' individual evaluations of the course content in the world, these comments seem justified. However, the comments also reveal the breadth of the coverage provided by the students. As the goal was to provide students with the capacity to evaluate real world persuasive content from the viewpoint of an experimentalist studied in the literature on persuasion, students necessarily need to be able to respond to a wide variety of content. Further recommendations for helping students' better navigate the blog are provided in the final discussion.

Student-produced videos: from finding to producing

An additional goal of the course was to have students create real world content that mattered to them—a valuable component of emancipatory action and participatory action research (Freire 1982; Whyte 1991). The found content exercises outlined above reflected one step towards achieving this goal. A second step was to have students create their own persuasive messages. On the blog, many students chose video content as their found content contributions. As part of their course project, students were asked to create their own videos and to describe in a separate essay

how this video embodied content outlined in the course. This aspect of crowdsourcing was therefore less about communicating content examples to others, and more about providing examples of critical pedagogy, where students use their content knowledge to make an impact on the world.

There were several motivations for taking this approach, which included using student's interests to promote pro-social persuasive messages and providing students with empowering experiences in relationship to the content. This produced high levels of motivation and gave students a clear sense of ownership. Most students want to make a difference. The student as producer model gives students the opportunity to do so.

Methods

Participants

These were from the same classroom as described above for the blog posts.

Procedures

Students were allowed to form their own groups of between two and four individuals. Students were asked to make 1-min videos about a pro-social topic of their choice. The video should construct a persuasive message with the aim to change the viewer's behavior, in whatever fashion the students felt appropriate. The students were provided with one 45-min session of instruction on each storyboarding and video content creation from the University of Warwick Learning Grid, which is a campus service provided by the University of Warwick to help students develop a wide range of skills associated with career development. Importantly, the Learning Grid provides student advisors who are skilled in video production and could instruct students about how best to use their time efficiently towards this end. In addition, there is a wide range of videos online (e.g., on YouTube) that can provide students with skills in these areas.

Because many students currently have the capacity to take video with their phones or with other devices which they own, the goal of producing persuasive video content provided students with a productive goal that they could aim to accomplish using resources at hand or readily available. For those without video capabilities, these were provided by the library.

In addition to the videos, each individual student was required to write a 1,000-word essay, with references, detailing how their video embodied strategies of persuasion described in the psychological literature. Thus, videos were produced by groups but essays were written by each individual. Essays represented the basis for the assessed mark, and this removed problems associated with differential contributions to the video and variation in video quality across groups.

At the end of the course, students were invited to a viewing of the videos and provided with lunch. At that time, students voted on the best videos and the students who created the three best videos were each provided with £30 vouchers for an online bookseller.

Results

As students worked in groups of approximately three, this produced approximately 30 1-min videos. Three videos that were well-liked by students and demonstrate work worthy of both student and course goals are as follows:

1. http://persuasion-and-influence.blogspot.co.uk/2013/04/no-means-no.html
2. http://persuasion-and-influence.blogspot.co.uk/2013/04/cyberbullying-shut-it-down_915.html
3. http://persuasion-and-influence.blogspot.co.uk/2013/04/organ-donation-ad.html

The videos demonstrated student knowledge above and beyond simple recognition of content. They put student knowledge into practice and, in the present case, did this towards a goal of the students' choice. Students videos were focused on a variety of pro-social messages, including promoting exercise, involvement in student-led university activities, vegetarianism, dealing with depression, how to respond in emergency situations, helping refugees from Syria, organ donation, and recycling. These varied in relation to professional quality and student ingenuity. Some videos involved actors. Others involved poetry written by students. Some involved contact with outside organizations who provided additional video content.

Student perceptions of the videos

Among the 47 students who provided written reflections at the end of the course, perceptions of the video assignment were more mixed than for the blogs. For example, one student wrote "I just finished the video assessment and thought it was really interesting and creative—like thinking outside the box." However, a common complaint regarding the videos was that they were time consuming and the students felt they should have started earlier on them. One student wrote, "I suggest taking out the filming for persuasive videos as they add more stress than the skills and knowledge gained from filming. There is lots of planning and time needed to invest that we might not have." Students also had mixed feelings about their utility. Students comments revealed that overwhelmingly students appreciated the video production, even if they noted that it took a great deal of work. Most students did not have video skills but where happy to learn them. Alternative approaches could, however, meet the same learner-centered goal and should be considered in relation to time constraints. For example, students could have made persuasive posters or created storyboards for persuasive messages. On the other hand, students were proud of their creations and they have been used outside the classroom to the benefit, for example, of on campus student societies.

General discussion

Crowdsourcing has always been a part of education. Historically, numerous educational approaches have relied on students teaching one another. As classrooms

grow, educators may feel increasingly compelled to join the stand-and-deliver culture that is common to current educational practices. Finding ways to share the stage with students is therefore increasingly important. The worry is that education, like many other aspects of modern life, becomes an extension of a consumer paradigm where students simply taste and sometimes digest educational messages produced by others. The development of crowdsourcing technologies for sharing student productions offers an alternative to this paradigm. The participatory action research described here is but one way to approach crowdsourcing in education. Others may include, for example, online forums and discussion groups. However, as the case study demonstrates, there is a great deal of potential in crowdsourcing content creation in the classroom. Below, further suggestions are provided about how this may be applied to other content areas as well as recommendations for further development of this approach.

Potential applications to other content areas

Crowdsourcing may not appear to be an approach as ideally suited for other topics as it is for the topic described here. This may be unnecessarily myopic. If educators believe that content is available in student's day-to-day experience—and many educators do—then it should be possible for students to document this in a way that benefits other students. Indeed, the initial idea to assign students the task of documenting places where content was embodied in their experience was developed in a course for teachers at the University of Texas at Austin's College of Education. Formative assessments were called *creative applications* and charged students with the task of documenting specific aspects of content in the real world in short one-page-only essays. This included topics such as behaviorism, Piaget's developmental stages, and Vygotsky, among others. Students had no trouble documenting connections they were able to make with the content in their daily lives and they did so every week. In principle, if we take constructivism seriously, then we accept that students will make these connections already even if they do not make them explicit. The goal of found content is to make them explicit, to increase the frequency with which they occur, and to leverage students' collective insight for the benefit of the class as a whole. Indeed, in the present case, this will extend to the benefit of future students and already extends to others outside the classroom. At the time of writing, the Propaganda for Change blog receives approximately 400 page views per day from around the world and has more than 200,000 page views in total.

This approach can easily be extended to other content areas. Topics related to mathematics, biology, chemistry, physics, and other areas are routinely discussed in the news. Most educators with appropriate pedagogical training have little trouble in identifying places where the rubber meets the road in their respective field. Even in cases where the content may not be so vividly displayed in front of students, students can still create content, e.g., by doing experiments or telling stories about situations that would involve the content. These too meet many of the psychological and educational principles known to enhance student understanding.

Recommendations for further development of crowdsourcing in the classroom

The conceptual framework outlined here has numerous potential areas for further development. One of these involves how students respond to each other's contributions. The Propaganda for Change case study used student contributions to populate the final examination, and this worked well to motivate students to read the blog. However, there is a clear sense in which the learning community could be further enriched. One potential way to do this is to assign students the task of evaluating other students' content (see Trivedi et al. 2003), similar to that embodied in online consumer-rating systems (Wulff et al. 2014). Alternatively, students could be assigned the task of identifying persuasion themes that were not identified in the initial post, or identifying other outside content that embodies the same content related themes. Ideally, these new contributions could be added as comments on previous material or as new posts that link to the previous material.

Another potential avenue for development is to attempt to gain further connections with outside communities about which the blog makes some commentary. For example, many students in the Propaganda for Change project wrote blogs about specific commercial organizations and their brands. If these could be communicated to the brands themselves, for example by emailing the link with an explanation of the student's goal, links could be further established with outside communities that may further help students engage with the content.

In many cases, in the production of student videos, students were advised to contact the outside organization that they aimed to promote. In several cases (e.g., promoting donations for Syrian refugees), outside organizations were happy to help students and provided students with additional material such as video content that helped them to complete their assignment.

Contact with outside communities is one place where crowdsourcing content creation has a potential advantage over other forms of content delivery. That is, because students are asked to create a real product, this product could have a real impact outside of higher education. Indeed, the assignment could be for students to make contact with an outside organization and to blog about what they learned. For a course like persuasion and influence, one could alternatively identify areas in the world around campus that could potentially be improved, for example, by identifying and communicating with community leaders.

One final comment is needed. Student produced content can take varying amounts of time and skill, and these variables are often controlled by the student. Educators need to be sensitive to the demands these tasks make on students. For large projects, like the video, starting early is critical. Also, it should be emphasized to students that produced content will not be assessed on its professional quality, but rather on the extent to which it judiciously embodies content. Finally, the student-produced content found on the Propaganda for Change blog is not as well organized as that found in a textbook. However, educators can increase the organization of these resources by having students produce content around specific themes at specific times. Further, by labeling their content accordingly, via tagging, folksonomies can be developed that allow for further organization and retrieval of content (Mathes 2004).

Conclusions

The present work provides a conceptual framework for crowdsourcing content creation by students and aims to demonstrate that the promise of technology is not limited to improving content delivery. Crowdsourcing content creation is explained both from the perspective of education and cognitive psychology and in relation to a case study. In particular, the Propaganda for Change project details two ways in which the student as producer model can be used to develop a broad body of content covering the material in a single course. This involved a student-populated blog that critiques persuasive messages for hundreds of commercial brands and everyday experiences. In addition, the students also created pro-social videos, with the aim to provide student contributions with the power to make real changes in the world. It is hoped that the description of crowdsourcing provided here helps expand the range of possibilities for new approaches to educational content. Many classrooms already incorporate a range of improved methods for social communication; students can communicate with one another in ways that have never been possible in the past. Further extensions of the present approach could involve Facebook groups for classrooms, Twitter, online forums, even comment sections following youtube MOOCs, all of which would allow students to communicate ideas, questions, and possibilities about content produced by others. The present article describes another approach and one that offers the capacity for collective input from both students and educators. Most importantly, however, it invites students into the process of deciding how content matters.

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