

Constructive use of authoritative sources among collaborative knowledge builders in a social science classroom

Fei-Ching Chen, Chih-Hsuan Chang, Cheng-Yu Yang, National Central University, No 300, Chung-Da Rd.,
Chung-Li City, Taoyuan County, Taiwan
fcc@cc.ncu.edu.tw, chsuchang@gmail.com, chengyu0911@gmail.com

Abstract: *Constructive use of authoritative resources* has been one of the important principles in knowledge building activities. However, how knowledge builders work together on their respective ideas and on external authoritative resources is understudied, especially in the social sciences when distinguishing advances made in the development of diverse ideas on a specific topic is a highly complex process for knowledge builders. Instead of using the conceptual inquiry thread as the unit of analysis, this study explores the responsive engagement of knowledge builders in each thread in order to reveal how achievement of deeper levels of knowledge advancement either were, or failed to be, achieved. In other words, the communal growth will be examined by evidence of authentic exchanges among knowledge builders. Results indicate that revised ideas were productive but knowledge building tended to remain incompatible with them. Possible explanations for the reluctance to incorporate idea improvement in social sciences are discussed.

Introduction

Knowledge building has long been regarded as a promising way to achieve quality learning. Although it has received much attention from science learning and teaching in the k-12 classroom for more than two decades, we know little about how it is carried out across curricula. Recently this issue has understandably been raised by Bereiter and Scardamalia in relation to the quality of learning. “Knowledge building”, particularly in the social sciences, is described by them as an approach to quality learning of conceptual content in which a depth of understanding is achieved through creating and improving explanatory theories (Bereiter & Scardamalia, 2012). In comparison with the definition of knowledge building in general (Scardamalia & Bereiter, 2003), it seems that this revised idea emphasizes a distinction between improving ideas relating to “general theories” in the natural sciences and to “theories of the case” in the social sciences. How do students in the university classroom contribute their notes on advancing theories that explain particular events and conditions? How do they adduce sources to support their case/event explanations? This study has two foci. First, we implement a principle-based design in a university social science classroom and try to identify the characteristics and potential challenges of knowledge building in different domains. Second, we are interested in how the principle of *constructive use of authoritative resources* is carried out by students in order to examine the relationship between their experience with idea improvement and the effect of this experience on their subsequent beliefs and their future approach to knowledge building.

Literature review

Advance of ideas in the social sciences

There is a period of reflection on the very idea of social science as a science modeled on the natural sciences (Flyvbjerg, 2001). The natural sciences excel at conducting decontextualized experiments to understand abstract and generalizable law-like relationships, while the social sciences conduct contextualized studies involving field research that produces intimate knowledge of localized understandings of subjective human relationships (Flyvbjerg, Landman, & Schram, 2012). Based on this distinction, we suggest that when people engage in revising ideas, one would expect to find many differences between the science classroom and the social science classroom when it comes to knowledge building.

At the school level, researchers speculate about factors related to the challenges of knowledge building in the social sciences (Bereiter & Scardamalia, 2012). The major one is the relative weakness of cognitive rewards for inquiry in comparison to those present in the natural sciences. They claim that raising the level of complexity with which students approach social issues is a more promising objective than striving for bisociative “big ideas”. Accordingly, pursuing explanations in a progressive way and producing new knowledge of value to their community is the principal work of students in knowledge building. Given that social sciences produce the kind of knowledge that grows out of intimate familiarity with practice in contextualized settings, knowledge builders will consequently contribute respective local knowledge emerging out of their own practice (Flyvbjerg, Landman, & Schram, 2012). Complexity is certainly expected but raising the discussion to a higher level becomes a new challenge.

Little empirical research has taken place on knowledge building in the social sciences. Some research projects have examined university courses in teacher education (Hong, Chen, Chai, & Chan, 2011); others have

explored psychology courses. The characteristics of threads in Knowledge Forums generated in the social sciences included lengthy notes and build-ons, multiple and diversified perspectives, a garbled set of directions and unidentifiable advances in ideas (Chen, 2012). On the one hand, some of these characteristics benefit knowledge building, but on the other hand, some inhibit it. These findings are, to some extent, consistent with what Scardamalia and Bereiter (1991) found – that the knowledge building platform lends itself nicely to divergent processes but lacks support for convergence. Following this line of inquiry, this study aims to go one step further and identify exactly how idea improvement is either achieved, or fails to be achieved, in this specific domain.

Research on constructive use of authoritative sources

Knowledge workers build on and advance the knowledge assets of their community by engaging in idea-centered discourse involving multiple perspectives, constructive criticism, progressive discourse and using a wide variety of resources (Sternberg, 2003; Bereiter & Scardamalia, 1993). In comparison to the natural sciences, it is more difficult for knowledge builders to identify authoritative sources in the social sciences than in the natural sciences. We therefore focus on the principle of *constructive use of authoritative sources* in this study.

The principle of *constructive use of authoritative sources* has been modified and augmented into “To know a discipline is to be in touch with the present state and growing edge of knowledge in the field. This requires respect for and understanding of authoritative sources, combined with a critical stance toward them.” (Scardamalia, 2002). Research has investigated how 12 principles supported quality learning in science (Zhang, Hong, Scardamalia, Teo, & Morley, 2011; Moss & Beatty, 2010; Lam & Chan, 2010). Research has also examined how this specific principle is used by knowledge builders in a PBL science learning activity (Yeo & Tan, 2010), in the understanding of optics (Zhang, Scardamalia, Lamon, Messina, & Reeve, 2007) and in a Peer Tutoring Project (Law & Wong, 2003). It is crucially important to scrutinize how constructively or how critically external sources are used by knowledge builders when it comes to the social sciences.

There are several issues which can be triggered by this principle, the first of which is achieving a balance between local and authoritative sources. Authoritative sources are traditionally considered to be books, experts (Zhang, et.al., 2007), Internet sources and teachers (Yeo & Tan, 2010). Yet external sources could go beyond them. Audio-visual sources such as YouTube and Facebook have much more powerful circulation than text-based Internet/hardcopy sources. In addition, distributed expertise plays an important role in the generation and improvement of local knowledge. It is debatable whether or not experts are more authoritative than young people themselves when dealing with adolescent affairs. If this kind of indigenous account were considered as local sources, it is obvious that local community sources have been given less attention than have external or authoritative sources.

The second issue involves the role of external sources in cycles of idea improvement (Chernobilsky, DaCosta, & Hmelo-Silver, 2004). Previous findings described the notes that contain authoritative sources and sorted them into two categories according to usage: introducing resources and going beyond resource material (Zhang, et. al., 2007). Others discovered and described instances in which authoritative sources were used to mediate the science meaning making process in a PBL activity (Yeo & Tan, 2010). Also some reported little evidence of further interpretation or of keeping a critical stance towards such materials (Law & Wong, 2003). Little to no research examined in detail the different usage of varied sources by knowledge builders and to what extent these sources produce further cycles of revised ideas.

Method

Participants

This study was conducted in a university course entitled “Adolescent Psychology” which was offered by the university’s Center of Teacher Education in Taiwan. The university is ranked as one of the best in the nation. Consequently, the students enrolled were all academically high achievers. Participants in the present study were 21 teacher-education students (14 females) who were pursuing majors in Mathematics (47%) , Physics (5%), English Literature (29%), and Chinese Literature (18%) other subjects. Thirty six percent of them were graduate students and 64 % were undergraduate students.

Principle-based design and implementation

This study employed a specific design to investigate the role of authoritative sources on idea improvement. By engaging students in this new form of pedagogy, three main instructional goals were: (1) to engage students in the revision of existing textbooks and in developing state-of-the-art knowledge about adolescent bullying; (2) to help students gain a more informed and practical understanding of knowledge building; and (3) to help students deepen the quality of asynchronous discourse via a Knowledge Forum (Scardamalia 2003). To these ends, a tutorial workshop about knowledge building theory, pedagogy and principles and how to use the Knowledge Forum for knowledge building was presented at the beginning of the semester. Focusing on the specific

principle *Constructive use of authoritative resources*, the major instructional activities included: (1) critical comments on bullying issues codified in any available textbook of adolescent psychology at the beginning and a revised paragraph related to bullying at end of this semester; (2) selected movies (i.e., *Odd girls out*) and clips on adolescent bullying introduced various types of bullying; (3) transcripts of each student's 1-hour interview with one local adolescent about their experiences and stories of bullying; and (4) most importantly, a 7-week long sustained online peer discussion about the issue of bullying.

Data sources

To address questions of how students use authoritative sources, what role they play in idea improvement, and how students changed (or did not change) their views about knowledge building and why, we collected the following sets of data: (1) students' online discourse which was recorded in a Knowledge Forum database, (2) a survey on acceptance and feasibility of knowledge building, and (3) interviews.

A multi-level analysis of discourse was performed on the recorded dataset in the Knowledge Forum. First, using notes as the unit of analysis, we were focusing on conversation structuring (Lonchamp, 2012). Notes were identified as belonging to certain categories based on the contributor who takes some aspect of the note or trace of activity of a prior contributor as being relevant for the present contributor's ongoing activity (Suthers & Desiato, 2012). In other words, in the present study, a single note was coded not only by the content of the note itself, but also by its relationship to adjacent notes. All the notes were sorted into two sets, one (set A) containing notes that involve authoritative sources, and the other (set B) containing notes without authoritative sources. By separating them and assigning different labels to them at the initial stage, we can later trace the interweaving relationships between A and B to discover whether authoritative sources inform and produce further cycles of idea improvement.

To explore the question of what kinds of authoritative sources were used by university students to develop new understanding, we examine the kinds of sources that they use as referenced in their notes. Authoritative sources can be divided conceptually into local sources and external sources (Zhang, et. al., 2007). Considering the nature of knowledge building in the field of adolescent bullying, we purposely identify information generated by *adults* as high level external authoritative sources (H), such as textbooks and Internet sources (i.e., movies). On the other hand, information generated by *adolescents* and late adolescents were identified as low level local community sources (L). This included interview transcripts with local adolescents and reflections from university students' personal experiences.

To explore the question of how different kinds of authoritative sources were used by university students, notes in set A were identified as belonging to one of three categories: A0 refers to notes that contain merely authoritative sources but do not express explicitly the contributor's claim or idea. A1 refers to notes reflecting the fact that the contributor is basically in agreement with the authoritative sources cited. A2 refers to notes that show that the contributor kept a critical stance or questioned the authoritative sources cited. Accordingly, notes in set B were further identified as belonging to 5 categories: B0 refers to an initial note of a thread or a note that does not relate to any previous one. B1 refers to notes in which the contributor is basically agreeing with the previous note. B2 refers to notes in which the contributor keeps a critical stance or raises questions toward the previous one. B3 refers to notes upon which the contributor elaborates or augment the previous ones. B4 refers to notes in which the contributor tries to conceptualize or theorize a concept based on the previous ones.

Table 1: Eight categories and their descriptions

Set	Category	Description
Notes with authoritative sources	A0	Use sources without revealing personal opinion upon them, either pro or con
	A1	Agree with the sources
	A2	Partly disagree with / or question the sources
Notes without authoritative sources	B0	Initiate a new claim /not related to the previous note
	B1	Agree with the previous note
	B2	Partly disagree with / question the previous note
	B3	Elaborate upon/augment the previous note
	B4	Draw conclusions or make inferences based upon previous notes

(A = authoritative, B = build-on)

Second, we use threads as the unit of analysis to trace both individual growth as well as communal growth on idea improvement. A2 and B2 were considered to be indicators of an attempt to revise ideas critically. The four categories, A0, A1, B0, and B1, are assumed to indicate playing a passive role in idea improvement. Alternatively, the last two categories, B3 and B4, are treated as playing a positive role in idea improvement. To evaluate idea-improvement collectively, we divided 7 weeks of discourse dataset evenly into two phases. A pair-

sample t-test was performed to examine whether there were any significant differences in each category in terms of idea improvement between the two phases. Ideally A/B 0 and A/B 1 would decrease significantly while A/B 2, B3 and B4 would increase significantly if the individuals were making progress in idea improvement.

Communal growth on idea improvement was traced by identifying “rounds of idea improvement (RII)”. We use the term “round” as a unit for counting the number of the emerging efforts on idea improvement in each thread as well as in the whole semester. Rounds are defined to be a series of adjacent notes in a thread starting with A2 and B2 and ending with A0, A1, B0, and B1. Then, if A2 and B2 re-emerge in a thread, this would be identified as a second round of idea improvement in that thread. In this way, A/B 0 and A/B 1 notes were treated as an interrupts of collective efforts toward idea improvement. In most of the chat or quasi-synchronous chat analysis, researchers generally cannot assume that a note is taking up the one before it (Suthers & Desiato, 2012). Nevertheless, there is an average lifespan of 32.3 days with an average of 4.3 notes per thread in the present study. Each thread has a much longer lifespan and therefore we assume that contributors have to some extent taken up adjacent contributions. A variation in RII of the two time phases is examined and the role of authoritative sources in RII is also reported.

Exploring the process of idea improvement is merely one part of the story in knowledge building. Surveying the change in beliefs before and after the knowledge building activities is another. The lengthy description of each KB principle provided by Scardamalia (2002) has been divided into three sub-points based on its meaning. Questionnaires were developed using a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) and containing 36 items to assess the students’ opinions on the acceptance and feasibility of 12 knowledge building principles (Chen, 2012). A pre-test was conducted after the tutorial workshop and the post-test was conducted at the end of the semester when students had finished their final assignments on a revised paragraph in the textbook.

The statistical t-test results of questionnaires will be incorporated together with interview data to see if there were pre-post changes in students’ views and why. Based on our observation notes, ten students representing heterogeneous attitudes towards this course were recruited to be our interviewees. The interview data were transcribed verbatim and used to help reveal student views on impediments and potential benefits to progress in the implementation of knowledge building.

Results & Discussion

The types and uses of authoritative sources

Types of authoritative sources: The distribution of authoritative sources in this course is shown in Table 2. Throughout the whole semester, students contributed a total of 113 threads containing 433 notes with a mean count of 20.6 notes generated per person. Due to the need to trace adjacent pairs in collective idea improvement, 21 threads containing only a single note and 17 rise-above threads lacking an original connection with previous notes were excluded. As a result, 75 threads containing 320 notes (Mean =4.3) were used as our sample and were sorted into categories. Two raters independently coded all the data and the inter-coder reliability was 0.82 ($p < .01$).

Table 2: Distribution of types and uses of authoritative sources

Type/Use	A0	A1	A2	Total
H1	2 (5.1%)	18 (46.1%)	19 (48.8%)	39 (29.5%)
H2	1 (4.5%)	13 (63.7%)	7 (31.8%)	21 (16.7%)
L1	2 (4.4%)	25 (60%)	17 (35.6%)	44 (34.1%)
L2	3 (11.5%)	17 (57.7%)	8 (30.8%)	28 (19.7%)
total	8 (6.1%)	73 (56.1%)	51 (37.8%)	132 (100%)

H1: movies; H2: text-based Internet sources & textbooks; L1: adolescent interview; L2: late adolescent experiences

The results show that the percentage of A-notes in whole data (132/320) is 41.2%. In terms of types, the teen-ager interview sources (L1) which were collected by each of the university students were the most cited ones. The adolescent movies (H1) were also much mentioned but H2 were the least referenced sources. The fact that L2 was used more frequently than H1 reveals that bullying is an authentic problem for these late adolescents. Two interesting points demanded attention. First, student use of authoritative sources in the digital age has shifted from text-based to video-based sources. Second, students preferred local and communal sources (L1&2) to external authoritative sources (H1&2). The findings of this study suggest that the conventional notion of authoritative sources, as perceived by most of the researchers in this community, should be reconsidered.

As regards the usage of these cited sources, the majority (56.1%, A1) of the notes reflect agreement with the sources, while there was substantive evidence (37.8%, A2) of notes disputing or challenging sources, based on information cited. In comparing with A1 (46.1%) and A2 (48.8%) within H1, we found that student agreement and disagreement were evenly divided on the detail in adolescent movies. Evidence shows that

movies as a kind of authoritative source were a very powerful means to motivate students' constructive use of sources.

Uses of authoritative sources: In general, notes were found to be distributed variously among the eight categories of notes (see Table 3). The percentage of all B-notes was 58.8%. Of all A and B notes, 23.4% were determined to be B2; 22.8% were A1; 19.4%, B3 and 15.9%, A2. It was surprising to discover that B2 notes occurred with greatest frequency. Going by the classification of the eight categories – A0, A1, B0, and B1 were treated as playing a passive role while A2, B2, B3, and B4 were defined as playing a positive role in idea improvement – 32.2% of notes fell into the former, passive categories while the latter active categories contained 67.8%. In other words, this class in general was intensively engaged in idea improvement activities. Nevertheless, while this tally of single notes provides a general picture of how students worked online in this database, it does not reveal much about how students actually built knowledge collaboratively with one another. To better understand the interweaving of A-notes with B-notes in their knowledge building, a series of thread analyses were performed.

Table 3: Distribution of notes on 8 categories.

	A0	A1	A2	B0	B1	B2	B3	B4	Total
# of notes	8	73	51	8	14	75	62	29	320
% of notes	2.5	22.8	15.9	2.5	4.4	23.4	19.4	9.1	100
	7	2	4	7	6	1	3	5	

The process of collective idea improvement

The collective idea improvement pattern. Pre-post comparisons were made between two phases from the early to the late stages of idea improvement. The results showed (Figure 1) a significant decrease in category A1 ($t=-2.73$, $p<.05$) and A2 ($t=-3.75$, $p<.01$) between the two stages; also there was a significant increase in category B2 ($t=2.19$, $p<.05$) and B3 ($t=2.50$, $p<.05$). It shows, at the early KB stage, that student responsive engagement tended to focus more on citing authoritative sources with either consenting or dissenting comments; while they shifted more to arguing with and elaborating upon previous notes at the latter KB stage. It seems that A-notes first played a scaffolding role in KB activities, and then these A-notes were able to elicit powerful B2 and B3 notes to improve ideas in a collective fashion.

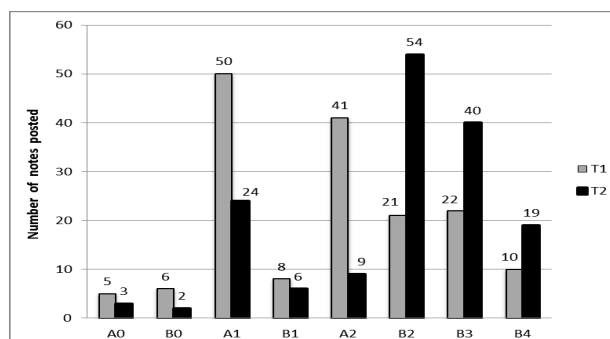


Figure 1. Changes in students' responsive engagement among 8 categories over a semester.

The rounds of idea improvement (RII): Threaded analyses were conducted to understand the interweaving relationships between A-notes and B-notes so that the effectiveness of authoritative sources on idea improvement could be examined clearly. In order to investigate the patterns of eight categories in each thread, threads with less than 5 notes were excluded from further analysis. The remaining left 28 long threads which, with each note categorized, were then made into a figure (Fig. 2) to illustrate the adjacent notes in each thread. Each line represents one thread. The order of the threads is determined by the posting time of the first note. Shading represented A-notes and Black represented B-notes. The number in each category was represented by the height of the bars with a line, single height, double height, triple height, and quadruple height representing 0, 1, 2, 3 and 4 respectively.

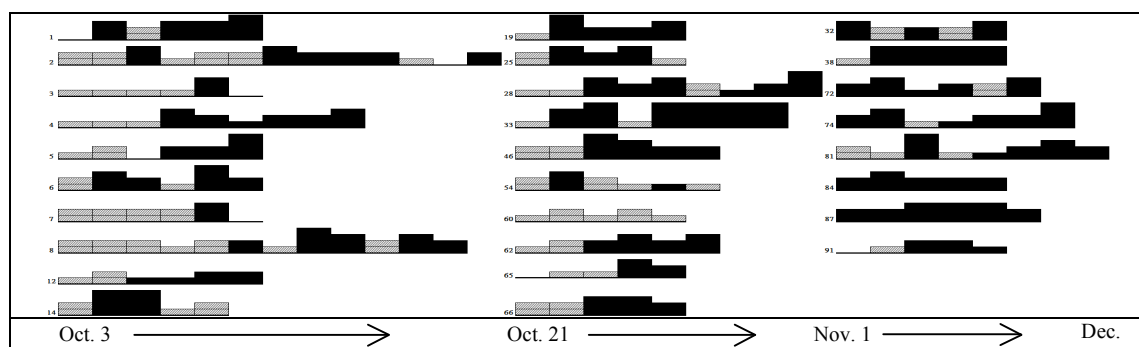


Figure 2. Rounds of idea improvement (RII) in 28 longer threads

The number of RII was further analyzed. Notes identified as either A2 or B2 were considered to be the trigger of idea improvement while A/B 0 and A/B 1 notes were treated as an interruption of idea improvement. In other words, RII ended with either an A0, B0, A1, or a B1. Then, if A2 and B2 re-emerged in a thread, it would be identified as a second RII in that thread. For example, the number of RIIs is 3 in thread #8, 2 in thread #28, etc.

Overall, there were 73 RII found in 57 threads and a total of 177 notes reflecting engagement in continuous efforts in idea improvement. On average, there were 2.4 notes within each RII. Given the average of 4.2 notes per thread in the present study, 2.4 was a fairly reasonable figure for the most important activity in knowledge building. It indicates that, with the constructive use of authoritative sources, A2 and B2 did inform adjacent notes and are shown to have had a more productive effect upon idea improvement.

On the other hand, threads without RII also deserve further attention. Eighteen threads which contained no RII had a total of 60 notes. Interestingly, half of them were B3 (23.3%) and B4 (20%). Although the threads without RII contained no indication of critical exchanges, B3 and B4 collectively achieved an even higher level of idea improvement. Moreover, examining the structure of a thread revealed more details about the students' style of engagement in knowledge building. Of the 75 threads, 45% of the initial notes were A1 and 27% of them ended with B2. This suggests that given the interweaving process of RII circles, the revised products remain divergent. It is not easy to collectively reach a convergent product.

Obviously the abovementioned multiple sources of evidence indicate that students in this class were collectively engaged very positively on idea improvement. The results so far included 1) The most frequently posted notes were B2, 2) the RII was substantive, and 3) the whole community shifted their energy from A1 and A2 to B2 and B3. However, evidence from the questionnaire suggests a different interpretation.

Student view of idea improvement in social sciences

Changes in students' perceived acceptance and feasibility of knowledge building. It was found that students tended to consider knowledge building to be both recognizable ($M = 4.4$) and feasible ($M = 3.9$) as these means were both higher than similar samples (Hong, et. al., 2011). To further understand if engaging students in knowledge building practice has an impact on their views about the acceptance and feasibility of knowledge building, t-tests were conducted. Notably, the results showed there was no significant difference between the pre- and post-tests (acceptance: $M=158.85$, $SD=12.33$ vs. $M=157.95$, $SD=12.84$, $t=0.43$, $p>.05$; feasibility: $M=142.00$, $SD=17.44$ vs. $M=141.15$, $SD=20.34$, $t=0.21$, $p>.05$). When looking into specific principles, the only significant increase in feasibility was found in principle #9, *constructive use of authoritative sources* (feasibility: $M=11.20$, $SD=2.07$ vs. $M=12.25$, $SD=1.77$, $t=2.50$, $p<.05$). Nevertheless, what is more important to know is why in general there was no significant difference after students had engaged in knowledge-building practice for a semester.

Messiness and difficulties in idea improvement in the social science. As the above findings reveal, although students had engaged in idea improvement in a fairly productive fashion for the whole semester, their perceived pre-post acceptance and feasibility remained the same. One explanation could be that their perceived acceptance and feasibility was already quite high, therefore there was little room for improvement. Another explanation could be that questionnaires are only part of the whole picture of their knowledge building experience. Our end-of-class interviews were conducted by one student in the class who later became our research assistant. It was very valuable to discover how two classmates discussed the practice of knowledge building on a collegial footing. Three concerns regarding the muddy trajectories encountered in knowledge building in social sciences arose.

Multiple foci within one lengthy note.

One of the features that differ from most Knowledge Forum databases in the natural sciences is that, in the social sciences, the length of each note tends to be much longer in comparison to those of regular discussion databases.

A: That note is too lengthy.

D: Is that right...?

A: So people couldn't find the focus. If you have three points, you need to post three notes instead of one note. I remember many notes in that thread were lengthy. Because of its length, every one read it differently and paid attention to different directions. Everyone tried to post something, the point which was sensitive to himself therefore differed.

Lengthy notes in general indicate greater effort on the part of the contributor. The knowledge builders in this class, however, felt that it was not convenient to figure out what was meant. Explanation is the main activity in the social sciences. Contributors quite often described particular bullying events and emphasized the specific contexts, conditions and details before addressing the points necessary to develop the argument. Thus, an issue emerges involving explanation-based knowledge building. When lengthy notes are replied to, a series of the build-on notes followed resulting in rather fragmented discourse. Each contributor emphasized a point relevant to the previous note, but these were often comparatively less relevant to the one that had in turn preceded it. Instead of a deeper evolution of understanding via threaded discussion, these threads of decreasing and sporadic relevance produced merely segmented and disjoint idea improvement in the long run.

No "better" theories at all.

It is difficult for social science students to consider themselves to be improving upon or surpassing the ideas of others. What are the effects of segmented criticism on knowledge builders?

C: I feel that if I reply to a note, it is just a different point of view.

D: So you think it is just a trivial opinion and makes discussion even messier. It is not necessary to post because there is no right or wrong involved.

C: Exactly. What everyone contributed is based on his/her own experience. And then these experiences after all represent just a case or two.

D: When others reply to your note, were their notes really irrelevant to yours?

C: There is something relevant. But they usually dispute about a very small part of my argument. I don't feel we are building anything, rather, I feel that by finding a loophole in my argument, it seems that he disagrees totally with this idea. If so, I don't feel we are discussing anything.

From the viewpoint of students, their real knowledge building experience in the social sciences was frustrated. They could go beyond expert knowledge and provide adolescent bullying events either from the movies or the interviews as local knowledge to develop their argument but the exchange of anecdotes often led to divergent dialogues and left many underdeveloped issues. Knowledge building simply degenerated into a game of "find the loophole".

Theories "among" the cases.

If depth of understanding is achieved through improving explanatory theories as quoted by Scardamalia (2012), how exactly can generalized theories be developed through analysis of specific cases in the social sciences?

D: It's just an exception. He is adding an exception in addition to your points. So do you think can "hit back"... a "hit back"-like response be a kind of knowledge building? People add exceptions in addition to your main argument...At this moment, what we need is not to put our knowledge together but to differentiate the difference between the general statement and a statement of exception. ...But these two are not compatible, but we have to incorporate both of them into a sort of well-developed knowledge. Do you think the co-existence of the two can be a complete knowledge building?

C: It seems that...many notes dealt with the exceptions.

D: Yes, there are many.

C: Thus viewed, it seems that these general statements were wrong. ...All are so confused.

D: The secondary supersedes the primary.

What kind of work does a social science community do in general? In progressing toward explanations of phenomena, students did endure messy situations and confusion about how to develop either general theories, theories of a specific case or theories among the cases (Flyvbjerg, Landman, & Schram, 2012). Within the scope of adolescent psychology, the students are seeking to generate a few salient claims or conclusions based on the bullying anecdotes of adolescents'. They compare cases from each other's repositories but then find no way to generate valid and valuable claims and inferences based on them. They are confused by this "messy" level of complexity in their KF discourse and consequently remain unconvinced by KB theory and disinclined to pursue them.

Conclusion

Our research acknowledges the significance of constructive use of authoritative sources but argues that traditional notions of authoritative sources should be reconsidered. New types of external sources such as movies on YouTube and community sources such as interviews with local adolescents are promising at present. We have explored the types and uses of authoritative sources by university students in idea improvement and have found that counter-arguments combined with authoritative sources scaffold well during the beginning stages; build-on notes with counter-arguments and elaborations followed in the latter stages. The unit of analysis, “Rounds of idea improvement”, was developed to measure the authentic responsiveness in a micro-analysis fashion. The RII showed productive work, while the pre-post survey revealed students’ frustration when encountering co-construction of knowledge in social sciences. There is clearly much more work that could be done to develop instructional design and to facilitate social science students in their efforts to build theories based upon cases or to produce intimate knowledge of localized and contextualized understanding of the social world.

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