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Scaffolding argumentation in intact class: Integrating technology and pedagogy

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ABSTRACT

This paper reports on the use of a set of online tools to scaffold the argumentation skills of students enrolled in Liberal Study (LS). The tools, collectively known as OASIS, were designed to support the online reading, writing, and evaluating activities of students engaged in fulfilling the learning objectives of the course. OASIS was designed to be integrated into the teaching and learning activities of the course. Two classes of students used the tools over an entire school year. We examined how the students used the tools to read and write arguments and how this affected their argumentation skills. The data collected included the number and types of tags students assigned to text passages and the quality of the arguments they produced in their written essays. Students' argumentation skills were found to be related to the number of tags they defined. OASIS was found to be effective in scaffolding students' argumentation skills. However, limitations were identified during task design, especially the design of collaborative peer evaluation tasks.

1. Introduction

The design of online tools to facilitate teaching and learning has attracted the attention of educators and researchers. Tools have been designed to scaffold learning in a number of areas including critical reading (Lu & Deng, 2012), writing (Neuwirth & Wojahn, 1996; Yang, 2010), reasoning (Toth, Suthers, & Lesgold, 2002), argumentation (Clark, Stegmann, Weinberger, Menekse, & Erkens, 2007), and problem solving (Friedman & Deek, 2002). Argumentation involves the exercise of both thinking skills and discourse skill. Further, given that argumentation pervades both academic life and everyday life (Kuhn, 2005), development of it ought to be an important educational goal (Mercer, 2009). Unfortunately, research has shown that students at all academic levels have difficulty developing argumentation skills (Knudson, 1991); even graduating high-school students have difficulty producing, understanding and evaluating arguments (National Assessment of Educational Progress, 1998; National Science Board, 2006).

Although, argumentation has received little attention in Hong Kong (HK), a recent report by the Hong Kong Examination and Assessment Authority (HKEAA) on the performance of students enrolled in Liberal Study (LS), a new core subject in HK secondary schools, states that although students in general "showed good understanding and knowledge in different topics", they were "poor in analyzing information from different perspectives and thus were not able to compare and argue with different evidence" (Hong Kong Examination and Assessment Authority, 2012). The report went on to suggest that since the argumentation skills of students were weak, schools should take steps to help students strengthen them. Two questions that arise here are what skills should schools teach and how should they teach them? That is what skills constitute good argumentation skills and how can schools integrate them into the regular curriculum? Generally, learning and technology design should take into consideration the needs, goals, activities, and educational contexts of learners (Andriessen & Schwarz, 2009). The learning contexts that are embedded in educational systems and are represented by teachers, should direct the design of learning environments as they strongly influence eagerness of learners to argue (Quintana et al., 2004).

This study sought to support the development of argumentation skills by embedding them in basic learning activities of students in Liberal Study. It explored the use of OASIS, a set of argumentation tools, to scaffold the reading, writing, and evaluation of arguments by LS

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students. More specifically, it focused on how OASIS supported students' reading activities and how this related to the quality of their written arguments.

2. Theoretical background

2.1. Argumentation skills

Although, argumentation skills and arguments can vary across subject areas e.g., psychology (Muller Mirza, Perret-Clermont, Tartas, & Iannaccone, 2009; Nussbaum & Sinatra, 2003), logic (Oaksford, Chater, & Hahn, 2008), philosophy (Walton, 1996), pragmatics (Van Eemeren & Grootendorst, 1994), and education (Kuhn, 2005), they also have features in common. For instance, argumentation involves both thinking skills and discourse skills (Kuhn, 2005; Muller Mirza et al., 2009) while arguments can be evaluated with respect of their structure and the quality of rebuttals (Erduran, 2007; Kuhn, 1991; Toulmin, 1958). Further, arguments can vary according to the expertise of individual arguers (Goldstein, Crowell, & Kuhn, 2009).

The most influential model of argument structure is Toulmin's (1958) six-component model: claims, data, warrants, backing, qualifiers, and rebuttals. Educational researchers have used Toulmin's model to investigate arguments in a number of subject areas (Chang & Chiu, 2008; Osborne, Erduran, & Simon, 2004). According to Toulmin, the quality of arguments should not be judged on the basis of individual components, but rather on their overall structure (Chinn & Anderson, 1998; Chinn, O'Donnell, & Jinks, 2000; Clark, Sampson, Weinberger, & Erkens, 2007; Means & Voss, 1996). Thus, Means and Voss (1996) proposed three levels of argument structure: skeletal, enhanced, and elaborated. A skeletal argument has one claim supported by one reason. An enhanced argument has one claim supported by one reason plus two or more qualifiers and an elaborated argument has two or more claims supported by two or more reasons plus two or more qualifiers. Chinn et al. (2000) graded argument structures from low to high. Low level arguments have simple reasons supporting claims while high level arguments are composed of complex networks of multiple sub-arguments and rebuttals. Similarly, Schwarz et al. (Schwarz, Neuman, Gil, & Ilya, 2003) arranged argument structures into a hierarchy ranging from simple claims to compound arguments. Thus, high level argument structures involve multiple perspectives that are supported by rich evidence. Salder and Fowler (2006) developed a five point rubric to assess the quality of argument by simplifying Toulmin's model to justifications for claims proposed by high school students, college non-science major students and college science major students. And finally Venville and Dawson (2010) evaluated the structure of argument on socio-scientific issues developed by high school students based on the presence of components of Toulmin's model.

Rebuttals involve "exceptional conditions capable of defeating or rebutting the warranted conclusion" (Toulmin, 1958, p. 94). They challenge the grounds of claims and indicate the quality of arguments as "oppositional episodes without rebuttals have the potential to continue forever with no change of mind or evaluation of the quality of the substance of an argument" (Erduran, Simon, & Osborne, 2004, p. 927). Research indicates that as rebuttals become more clearly identifiable the quality of arguments improves (Clark, Sampson, et al., 2007; Erduran et al., 2004). Rebuttals indicate the quality of arguments in that they challenge participants to evaluate the validity and strengths of arguments (Erduran, 2007). Further, rebuttals are evidence of the development of cognitive argumentation skills (Kuhn, 1991).

Although, argumentation structure and rebuttals are good indicators of argumentation skills, it is difficult to directly connect them to the development of class argumentation activities. Thus, it is important to understand the processes and activities through which students develop argumentation skills in the class.

2.2. Argumentation in class: reading, writing, and evaluating arguments

Given that a great deal of the argumentation that takes place in the classroom, occurs in face-to-face and online discussions, peer evaluation, and in written essays, there is an increasing recognition of the need to develop learning activities that provide students with authentic tasks aimed at fostering the development of effective argumentation skills (Means & Voss, 1996). One natural way of integrating argumentation skills into instruction is to develop activities that involve reading, writing, and evaluating arguments. Although, it is relatively common for students to engage in oral argumentation with peers in school playgroups or with family members at home, it is difficult to engage them in high quality classroom debates (Andriessen, 2009; Garcia-Mila & Andersen, 2007) and it is even more difficult to get them to focus on writing high quality arguments. Children acquire oral argumentation skills in non-academic situations at home and at school. However, acquiring written argumentation skills involves more than simply learning to engage in oral debates. Rather, the problems facing children regarding the acquisition of argumentation skills involve not only the development of basic literacy skills, but also the ability to examine, compare and select diverse facts, ideas, arguments and opinions from a variety written sources, and to anticipate and rebut objections or disagreements (Muller Mirza et al., 2009).

Thus, teaching students to write arguments poses pedagogical challenges to teachers (Kelly, Regev, & Prothero, 2007). Helping students identify the key elements of arguments during reading might help. Students must be able to analyze the arguments they read in order to write effective arguments. They must be able to interpret written sources, extract and examine ideas, organize and compare perspectives and opinions, and select and analyze information to be used in writing arguments. However, the processes by which students "transform source texts into well-reasoned claims" addressing specific issues (Higgins, 1993, p. 73) have received little attention compared to oral and written argumentation. Thus, we need effective ways of helping students learn how to read-to-argue (Higgins, 1993; Lu & Deng, 2013).

Students are often involved in peer assessment during which they evaluated each other's written argument. Evaluating the arguments of others (Kuhn & Goh, 2005) involves: (1) identifying key elements of arguments and (2) judging their quality, e.g., are they reasonable, do they provide sufficient evidence. Students are weak in evaluating the epistemological characteristics of arguments or what they understand arguments to mean (Goldstein et al., 2009). This suggests that students focus on the content of arguments as opposed to their structure and reasoning because they judge the arguments of others based on their own preferences and ignore the epistemic strengths or weaknesses of the arguments themselves (Kuhn, 2005). Larson, Britt, and Kurby (2009) found that students improved their ability to evaluate arguments with a little training in evaluating them and immediate feedback.