

"Good Moves" in knowledge-creating dialogue

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Abstract

Dialogue is the mainstay of idea-centered education at all levels and is especially important in generating new knowledge or improving existing knowledge. This paper outlines types of "good moves" in knowledge-building dialogue – that is, constructive dialogic actions that can contribute to attaining goals of such dialogue – to solve problems, resolve disagreements, generate innovations, new concepts and conceptual structures. The focus of the discourse moves schema is on knowledge creation, with critical thinking entering as an important adjunct. Although only functional elements of knowledge-building dialogue are indicated, not more detailed processes, the scheme is applicable to the design of technological supports for such dialogue and for acquainting students with this kind of dialogue and the competencies that need to go with it.

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The central role of dialogue in knowledge creation has been well recognized (Tsoukas, 2009; von Krogh, Ichijo, & Nonaka, 2000). It is probably fair to say that collaborative knowledge creation is not only supported by, driven by, and reflected in dialogue but that it actually takes place in dialogue – even though the dialogue may in some cases revolve around physical activity such as collaborative tinkering, building concrete artifacts, or sports team practice. Knowledge Building, which is the same concept as knowledge creation, elaborated within an educational context (Bereiter, & Scardamalia, 2014), has put particular emphasis on dialogue as the medium in which community knowledge is constructed (Scardamalia, & Bereiter, 2014). Knowledge Forum and its predecessor, CSILE, the technologies most closely associated with Knowledge Building (Scardamalia, 2003), are primarily collaborative discourse environments especially styled to support knowledge-building/knowledge-creating discourse. Collective responsibility for knowledge advancement figures prominently in Knowledge Building, reinforced by social norms of democratization, fairness, idea diversity, and individual willingness to contribute to a common goal.

According to Walton (1998), what sets dialogue apart from many other kinds of conversation is its goal-directedness. Goals may vary – to resolve a dispute, to reach a decision, to solve a problem, and so forth – but in any case goal-related parts of the dialogue may be viewed as consisting of strategic moves (Conklin, 2005). As in games of strategy, chances of success can be increased by making better moves. Unlike well-structured games such as chess, however, the set of permissible moves is not fixed. Chances of success may therefore also be increased by increasing the repertoire of moves participants have available to draw on. Drawing on various sources spanning a broad literature on knowledge creation and dialogic approaches to the creation of new knowledge, this paper identifies dialogue moves and provides examples, but it makes no claim of being exhaustive.

Much of the research on dialogue processes has dealt with interpersonal dynamics in which differing needs, dispositions, backgrounds, or agendas of participants figure prominently (e.g., Ander-

son, Baxter, & Cissna, 2004). The purpose of interpersonal dialogue is typically interpersonal understanding. One long-term research project has focused on the educational functions of dialogue. It is the "Thinking Together" project, which has engaged a number of researchers in the U.K. (Dawes, Mercer, & Wegeriff, 2000; Littleton, & Mercer, 2013; Littleton et al., 2005; Wegerif, 2013). Although many aspects of dialogue are considered, the focus has been on establishing "ground rules", which have mainly to do with interpersonal factors – establishing norms of fairness, mutual respect, open-mindedness, and the like. Such norms are vital in transforming a group into a functioning community, and thus are important for any group, such as a school class, a sales team, or a theatrical group, whose members are expected to work together over an extended period of time. The strategic discourse moves discussed in the present paper may be viewed as identifying something additional that is required in order for a community to become a knowledge-creating community. In combination with general socio-cognitive norms, a repertoire of knowledge-creating discourse moves may be essential for a community whose discourse does not simply facilitate the sharing and evaluation of ideas but that actually generates and builds new structures of ideas and inventions.

Every dialogue move can have interpersonal implications, which may in some cases have a negative effect on the collective knowledge-building effort and in other cases may contribute positively to idea development. Interpersonal issues may become the focus of discussion in "meta-discourse" – discourse about the progress of the dialogue, which includes attention to things that may be blocking progress toward objectives. This may be thought of as the troubleshooting part of community development. In the normal course of collaborative knowledge creation, socio-cognitive norms remain in the background but are apparent to outside observers. Visitors to Knowledge Building classrooms often remark on the atmosphere of civility, mutual support, and shared enjoyment they perceive. We suggest, however, that this is not a separable aspect of Knowledge Building, something that could be developed independently, with knowledge creation added later as an enhancement. From the beginning the socio-cognitive

climate of a Knowledge Building classroom depends on a sense of progress being made, of frontiers being extended, and it is in this context that we believe strategic knowledge-creating discourse moves can make a contribution.

A theoretical model of knowledge-creating dialogue does not, to our knowledge, exist. Such a model would need to encompass interactions at both the interpersonal and at the ideational level: ideas interacting with ideas as well as people interacting with people (Bateson, 1972). What, then, is the value of an analysis focused in a rather abstract way on discourse “moves”? The game of chess provides one answer. Chess (when played between human beings) has self-management aspects, such as maintaining concentration and meeting time constraints, and interpersonal aspects such as intimidating or misleading an opponent, in addition to the logical aspect of identifying and evaluating possible moves. But the logical evaluation of moves can be studied in its own right; in fact, many books and regular newspaper sections are devoted to it. The notion of “good” moves is partly inspired by the intriguing finding of Chase and Simon (1973) that chess grand masters do not actually think farther ahead and consider more moves than lesser players, they only consider good moves! How in the world can one identify good moves in advance of analyzing them? The explanation apparently lies in superior knowledge. Chase and Simon emphasized the vast tacit knowledge chess masters accumulate, knowledge that provides them with an efficient “vocabulary” or set of categories for considering moves. It has further been established that master chess players read a lot; in one large study, amount of time devoted to study was found to be the strongest predictor of competitive standing (Charness et al., 2005). This accumulated knowledge is what we have called knowledge of “promisingness” (Bereiter, & Scardamalia, 1993). It is a cognitive resource that supports not only wise judgment but also creative thinking.

1. Knowledge building discourse moves

Seven types of discourse moves are considered. Although many of these are familiar features of academic discourse about ideas, our fo-

cus in this paper is on the part they can play in knowledge-creating discourse not necessarily limited to the academic sphere. Table 1 provides an overview of moves to be discussed.

Table 1. Types of dialogue moves, with examples

Dialogue move	Example
Problem definition	Clarifying the essence of the challenge, why it is important, and why has it not been addressed already
New ideas	Introducing new concepts, distinctions, or analogies and connecting them to current state of art
Promisingness evaluation	Considering which idea has greater potential for development into a theory, design, or product and how it relates to alternatives
Meta-dialogue	Reflecting on the discourse, evaluating its progress, recognizing individual contributions and collective accomplishments, troubleshooting when the discourse is perceived as not going right socially or conceptually
Comparison	Looking beyond the immediate sphere to analogous problems and solutions, connecting ideas across problem and community boundaries
Critical discourse	Considering the trustworthiness of information on which a particular design decision is based
Higher-level ideas	Working collaboratively to develop an idea that has application beyond the current problem domain

The first three types of moves represent the main line of pursuit of any knowledge building goal, be it the solution of a problem of explanation, the design of a product, the production of a historical account, or any sort of complex knowledge-advancing product. The remaining four represent important kinds of excursions from the main line, excursions that can deal with impediments, deepen inquiry,

or illuminate the process. Although there is a certain sequential logic to the first three types of moves, there is no sense in which this is a procedural model. Like conversation of all kinds, knowledge-creating dialogue is improvisational (Sawyer, 2001), with emergent results. If represented by a flow chart, every move could have arrows leading to every other move, resulting in a useless chart.

Problem definition and analysis

Knowledge creation can be treated as a variety of problem formulation and problem solving, with problem solving viewed broadly as any goal-directed activity in which the path to the goal is unknown and must be discovered or invented (Newell, & Simon, 1972). By this account virtually all productive thinking is problem solving. There are various kinds, ranging from the local and trivial (Where did I leave my glasses?) to the world-changing (finding ways to halt or reverse global warming). To count as knowledge creation the new concept, distinction, invention, or solution must have application beyond the immediate situation, be communicable, and involve an element of creativity. Comparisons of expert and novice problem solvers have shown that experts usually invest more effort in analyzing the problem and casting it in a form that enables them to apply available knowledge, whereas novices are more inclined to skip over this part and plunge immediately into seeking solutions (Glaser, & Chi, 1988). Within the “Problem Definition and Analysis” category are a number of generic questions, that is, questions worth raising in any knowledge building effort:

1. “What is the problem?” This is a question that may be revisited during the course of knowledge-creating dialogue as the goal is revised or comes to be seen in a new light. Hakkarainen and Sintonen (2002) show how reformulating questions and generating sub-questions play a significant role in deepening understanding.
2. “Why is it important?” This will often be obvious as to the main goal, but as sub-problems are identified it becomes a question useful in steering away from trivial or unproductive problems.

3. "What is the essence or heart of the problem?" This is a question inspired by Douglas Hofstadter's statement (1995) that "a sense for essence is truly the essence of sense". Although according to Hofstadter seeing "to the core of the matter" is not generally reducible to well-defined procedures, it is something people can often do with ease and is "the key... to all intelligence" (p. 75).
4. "Why hasn't this problem been solved already?" This was a question recommended by Tim Berners-Lee on his website (but no longer available). The answer, especially for novice knowledge creators, will often be that it has already been solved. However, this need not spell an end to the inquiry. Instead it may call for reformulating the problem so as to take account of what is already known. For students, the reformulated problem may often be to explain the answer that has been found or to solve the additional problems it raises.

New Ideas

This includes all discourse moves that are intended as a direct advance toward the knowledge creation goal. There are many possible moves of this kind, but the following five are generic:

1. New concept. Nonaka and his collaborators (Nonaka, & Takeuchi, 1995) have characterized knowledge creation as creating a new concept.
2. New distinction. Tsoukas (2009) has identified making a new distinction as the precursor of creating a new concept. New distinctions, Tsoukas suggests, may arise in the course of arguing to defend one's idea against a competitor. A new distinction allows both ideas to survive.
3. Synthesis. As opposed to simply combining ideas additively (acknowledging value in difference) or agreeing to disagree, synthesis creates a new idea that builds on and preserves some of the value of disparate ideas. Although an old idea, it has been influentially put forward to the business and education communities by Roger Martin (2007) as "integrative thinking".

4. Analogies. Many writers have emphasized the importance of analogies as stepping-stones to knowledge creation (e.g., Holyoak, & Thagard, 1995).
5. Abduction. Abductive reasoning (Paavola, 2004), in knowledge creation contexts, involves making conjectures which, if they prove valid or can be realized, provide the basis for a problem solution. For example, Francesco Redi, a 17th-century scientist, conjectured that if maggots appeared on rotting meat only when flies had access to it, this would disconfirm the prevailing theory of spontaneous generation. When this proved to be the case, and when furthermore the maggots that appeared on meat exposed to flies metamorphosed into flies identical to the ones given access to the meat, a new and well-founded explanation of maggots was achieved – now recognized as an important step on the way to the germ theory, later developed and confirmed by Pasteur (Gottdenker, 1979).
6. Important facts. Although factual statements have an essential role in most kinds of knowledge creation (fantasy constructions being the main exception), they can clutter up a dialogue. Important facts are ones that can be put to immediate use in the knowledge-creating dialogue, and are thus to be distinguished from facts that are relevant to the topic but do not advance the knowledge-creating effort.

These six kinds of contribution to “new ideas” are not so much discourse moves in themselves as they are *achievements*, arrived at through discourse moves yet to be identified. What kinds of moves, for instance, achieve new distinctions or productive analogies? Those are the questions that a more complete discourse model must answer.

“Promisingness” evaluation

In complex knowledge creation, single ideas seldom constitute problem solutions and neither do simple combinations of ideas. Substantial further work is normally required to develop ideas into something that fulfills a knowledge creation goal. Whether a partic-

ular idea will prove valuable in the end cannot generally be known with certainty. Therefore a significant challenge in all creative work, in both the fine grain and the large, is to identify promising ideas and to avoid wasting time on or becoming entrapped by unpromising ones (Chen, Scardamalia, & Bereiter, 2015). Judgments of promisingness are based on knowledge. Sometimes the knowledge becomes so well established that it is formalized (for instance, the knowledge that trying to build a perpetual motion machine is not a promising path for an inventor to follow); more often, however, the knowledge on which promising judgments may be based is implicit or episodic knowledge gained through past creative efforts. Promisingness judgments may be relevant at any choice point in knowledge building; in all cases such judgments are discussible, and agreement among collaborators may be needed as to the most promising choice for moving forward.

Meta-dialogue

This is dialogue about the dialogue – how it is progressing, where it is heading, what is hampering progress, and so on (Resendes et al., 2015). Although statements of a meta-dialogic nature may come up at any time, serious meta-dialogue usually involves collective reflection. Three important foci of meta-dialogue or meta-discourse are:

1. The present state of the knowledge-building/knowledge-creating effort. Are we making progress? If not, what is blocking us? Are we overlooking something important? Is there important information we don't have? And so forth.
2. The state of knowledge in our area of inquiry. What is settled and what is still an open question? How does our work connect with what is going on elsewhere?
3. How we are functioning as a knowledge building community. Is everybody taking part? Is anybody feeling left out or at odds with what is going on? Are we actually listening to each other? Are we all taking responsibility for idea improvement and advancement or are we leaving too much responsibility to particular individuals or the teacher or manager?

4. Next steps. Periods devoted to meta-dialogue could be followed by a return to whatever was going on before, by a shift associated with any of the various dialogue moves, or by stepping outside the dialogue – to conduct empirical research, for instance, the results of which would be brought back into the dialogue in the form of new ideas or “important facts”.

Comparison

Comparison to things outside the immediate sphere of inquiry is a way of gaining perspective, generating ideas, and forming productive analogies. Good moves could include:

1. Identifying similar tasks in different domains. For instance, *checking in* may be found to be essentially the same problem whether it is checking patients into a hospital, passengers on to an airline flight, guests into a hotel, or customers into a car rental. As a result, procedures that have proved to increase the efficiency of one variety of checking in may be applicable to another.
2. Identifying analogous problems. The problem we are having in explaining X may be similar to explaining Y, because at a deep or sufficiently abstract level the problems are the same.
3. Identifying analogous solutions. An example was Darwin’s realization that stock breeding provided a solution to the problem of speciation if natural selection took the place of selective breeding.

Critical discourse

At any point in knowledge-creating dialogue the truth or trustworthiness of some statement may be called into question. Dealing with such a question involves stepping outside of “design mode”, in which invention, theorizing, planning, and the like take place, and into “critical mode” (originally called “belief mode”) which is the mode of evaluating knowledge claims (Bereiter, & Scardamalia, 2003). Critical mode differs from design mode in both goals and methods and is distinguished by the kinds of questions asked:

1. "Is it true that...?" This question, or variations on it, essentially defines critical mode. Statements brought into question may have been explicitly stated or may be implicit assumptions.
2. "Does it matter?" Once a belief issue is raised in a knowledge-creating dialogue, it is important to ask whether it matters, lest the dialogue be led off into an unproductive byway.
3. "Which alternative should we believe?" If it is determined that the belief issue does need to be settled, the discourse may move into one or another form of argumentation. Toulmin's (1958) argument model may be applied here. However, it presumes a pro and con controversy, whereas there are other kinds of arguments, as elaborated by Andriessen and Baker (2014).
4. "Is the information good enough for our purposes?" Often in knowledge-creating dialogue it is not necessary and it is frequently impossible to establish the exact fact of a matter. The issue is whether the available information is good enough for its purpose. Whether the information is an opinion poll result or a handbook datum on the melting point of a certain alloy, there is an explicit or implicit margin of error and the practical issue is whether the intended use can tolerate that margin.

It should be recognized that in a well-functioning knowledge-creating community some members may be working in critical mode at the same time as others are working in design mode, and that productive interchanges can result.

Higher-Level Ideas

Higher-level ideas are ideas that have application outside the current problem domain. Often they have the same name as their lower-level counterpart. For instance, *regulation* is an important concept in the domain of environmental problems, where it usually refers to rules that must be obeyed, such as rules governing waste disposal. But at a higher level, *regulation* is a limited form of control that may be distinguished from *management*. Lobbyists opposing regulation take advantage of the public's lack of the higher-level concept and thus, for instance, condemn the regulation of banking as constituting gov-

ernment take-over the banks – hence, socialism. In practical areas, higher-level ideas sometimes prove important in solving the immediate problem. For instance, the Wright brothers' investment in producing a principled solution to the problem of lateral control resulted in an airplane that could not only regain balance if it started to roll (which was their objective) but that introduced a whole new level of navigability that opened the door to aviation as we now know it (Bereiter, 2014). Thus a side trip into building higher-level ideas seems worth taking in all but the most urgent circumstances. However, it always involves some investment of effort over and above what appears necessary for solving the immediate problem. Again, in a well-functioning knowledge creation team some members may be working to build higher-level ideas while others are working on the immediate problem, with productive interaction between the levels of work with ideas. (Team leaders may see their job as taking a longer-distance view or as integrating the work at different levels.)

2. Uses of a Dialogue Moves Schema

A schema with the seven kinds of discourse moves discussed here may be useful in analyzing actual dialogues for practical and theoretical purposes; it may be useful instructionally, both in designing learning experiences and engaging students directly with good moves in knowledge-creating dialogue; and it may provide direction for efforts to design software supports for knowledge creation. For instance, Knowledge Forum uses semantic or epistemic markers that have typically marked the content of notes as it relates to a knowledge-building effort: e.g., “My theory”, “I need to understand”. Markers indicating discourse “moves” could help users take a more strategic view of their contributions, more of a focus on how the note is intended to move knowledge-creating discourse forward.

Children's ability to generate ideas is common knowledge. Two of the seemingly more advanced kinds of moves, promisingness evaluation and meta-dialogue, have been shown to be within the reach of early primary school children and to produce positive results (Chen, Scardamalia, & Bereiter, 2015; Resendes, et al., 2015). New technol-

ogy designs helped students select promising ideas and view their discourse from novel perspectives. This research suggests that knowledge practices and technology can be developed to support the incorporation of all seven types of dialogue moves into classroom discussion from the earliest school years. Regardless of whether the teacher is an active participant in the dialogue or not, the teacher's main task in knowledge building is developing a community in which idea development and idea improvement are socio-cognitive norms that pervade the life of the community (Scardamalia, 2002). Knowledge-creating dialogue moves are not going to directly foster such community development, but in order to keep such a community alive and to keep knowledge creation as its purpose, students and teacher must have a genuine and persistent sense of progress being made, of knowledge frontiers advancing. To achieve that, the community's discourse must advance with all feeling they are contributors. It must be an engine that generates new knowledge, and for that purpose an exposition of knowledge-creating dialogue moves provides a way of looking beneath the hood and seeing the engine at work.

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