2001

Emotion and Meaning-Making: Affordances in the Classroom

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Abstract

It is well known that emotion plays a significant role in the learning process. In this study, we describe affect/emotion incidents as part of students' personal knowledge construction efforts in three sixth grade classrooms. These affect/emotion responses are identified by word choice, topic, punctuation, or description. The role of each classroom as it served as an affordance for affect/emotion knowledge construction efforts is also discussed. We posit that the role of dialog and activity choice, which traditionally lie within the hands of the teacher, serve as the primary affordances through which students are provided opportunity to use affect/emotion responses in their classroom learning.

Introduction

It is well known that emotion plays a significant role in the process of learning (DeCatanzaro, 1999) and the meaning individuals make of experience. It serves as a natural motivator to acquire information, seek understanding of one's environment, and make sense of experience. In this study, we describe the incidents of students' links to prior experience and seek to understand what elements of three instructional environments served as affordances for student knowledge construction that includes emotional and/or affective components. First, we provide a brief theoretical background and describe the larger study from which the current study is derived.

Background

Emotion has been shown to link behavior to experience in models of operant conditioning where emotions have been trained to evoke responses to stimuli that did not originally elicit them (Estes and Skinner, 1941). More recently, the field of cognition and learning has begun to consider the relevance of emotion as a modality through which individuals build knowledge. Knowledge can be built and recalled based on emotional relevance, or association, as well as cognitive association (Lakoff and Johnson, 1999; Wicklegren, 1997). In this, a sensory *or* cognitive event can trigger knowledge through emotional relevance to the stimulating event. For example, a recollection of a tornado may be prompted by a discussion of weather or a discussion of scary experiences. Lubert and Getz (1999) describe an emotional resonance mechanism that accounts for the activation of experiences related emotionally that may not be directly related as would be for cognitive activation (i.e., spreading activation). In this, a particular emotion associated with an experience "resonates" when recalled. This resonance causes sympathetic vibrations to similar emotions, thus activating other experiences that, on the surface, may not seem related to the first experience. Emotional resonance provides increased opportunities for linking prior experience with current.

To further explore this fusion of cognition and emotion, we draw on the field of semiotics. The study of signs and their use provides an explanation of the meaning-making process. Perhaps too simplistically, a sign is something that stands for something else (an object, but again, this is very basic). This sign only exists through an interpretant—or the meaning that an individual develops to the sign relationship. There is a trichotomic relationship among the three elements: object, sign, and interpretant. Essentially, the sign comes to represent the meaning that has been developed by a particular individual in a given context. As meaning is made, the potential exists for continuous generation of more signs, thus providing for on-going meaning-making (or unlimited semiosis as it is called) (Peirce, 1985). This theory allows us to consider how different modalities, in particular emotion, provide an impetus for this meaning-making process.

In this meaning-making process, we consider the role of emotion as an affordance in the classrooms—environments that, we hope, foster meaning-making. Affordances are those items in an environment (e.g., concepts, ideas, emotions, objects) that enable individuals to learn about something larger than the items in the environment itself (Gibson, 1996). Thus, affordances "are qualities of systems that can support interactions and therefore present possible interactions for an individual to participate in" (Greeno, 1998). Learning environments, as we describe here, include social and emotional, as well as physical environments. Thus, affordances may exist in any of these venues.

In particular, we consider the affordances available through the classroom dialog and the role of the teacher in that dialogic process. Dialog has been shown to be an affordance commonly appropriated by children as they learn the cultural norms and moral system of an environment, particularly in classrooms (Burbules, 1993; Noddings, 1994). Burbelous points out that Bakhtin noted that language itself, as dialog, is more than many people expressing many points of view. It is heteroglossia, an inherent condition of spoken language, which is non-consensual, and multi-voiced

as it serves to create various meanings among the society in which it functions. Thus different individuals, even upon hearing the same information presented, will perceive the information uniquely (i.e., a sign develops). Further, in that communication process these variations are represented by inequality in the notoriety, attention, and centralized acceptance of certain voices over others. While personal interpretations remain, there is also a process wherein common understandings are created. In that process, the more powerful voices in a community significantly impact the rules that govern how that community or environment functions. We consider the classroom as such an environment and the teacher as a potentially powerful voice.

For this study, the three participating classrooms were initially described in terms of learner-centeredness as determined by student perceptions of the classroom. Learner-centered instruction is distinguished from teacher-centered instruction by nature of the teacher-student relationship. In a teacher-centered model of instruction, the teacher's role is seen as imparting knowledge to students and instruction proceeds from the teacher's point of view (Wagner and McCombs, 1995). In this framework there is the assumption that the teacher needs to do things to and for the learner; i.e., the teacher should engineer conditions outside the learner to accomplish desired outcomes. Thus, the teacher decides for the learner what is required from outside by defining characteristics of instruction, curriculum, assessment, and management (Wagner and McCombs, 1995). Therefore, we believe that the teacher's perception has a significantly more powerful voice in the environment.

Learner-centered instruction (LCI), in contrast to teacher-centered instruction, provides opportunities for learners to draw on their own experiences and interpretations (McCombs, 1997; Wagner and McCombs, 1995), thus the students' perceptions is given a contributing voice. LCI focuses on individual learners, their heredity, experiences, perspectives, backgrounds, talents, interests, capacities, and needs (McCombs, 1997). LCI proposes that teachers need to understand the learner's reality and must support capacities already existing in the learner to accomplish desired learning outcomes. Learning goals are then achieved by active collaboration between the teacher and learners who together determine what learning means and how it can be enhanced within each individual learner by drawing on the learner's own unique talents, capacities, and experiences. The teacher-student relationship is restructured to focus on learning from the students' perspective.

The findings reported in this paper stem from a larger study (Schuh, 2000) describing how students integrated their prior knowledge and experience with the new information and learning opportunities to which they were exposed in their classrooms. The classrooms differed in degree of learner-centeredness. In that study, use of prior experience and knowledge was operationalized as knowledge construction links, those identified incidents where learners brought forth personal, and often tangential information, within their

current learning in their classrooms. Details about the methodology used for this study are described later in this paper.

These knowledge construction links were further characterized as combinations of cues and trajectories. Cues are stimuli that serve as affordances, prompting students to digress from the topic at hand to a different, but related, topic area or idea and may be perceived as being off-track. Cues can be single or multiple. Ten cue types emerged in the data: Sounds like, Looks like, Feels like, Is a, Same word but different concept, Same concept but different context, Same concept and same context but different content, Same concept and same context with same content, Different concept within same context, Series, and Complex relationships (Schuh, 2000).

Trajectories follow cues. A trajectory is a path, generally a re-presentation or memory, and is described by its nature or type. A trajectory generally included some type of experience (acting experience or specific episodic memory, generalized experience, future experience, and/or operative experience). In addition, the context of the experience, including the characters involved in the experience, was identified (Family, Friends, School, Society, Media). Affect/emotion, the tenth trajectory type, was assigned to those knowledge construction links that included an indication of emotion or affect. Trajectory types were generally multiple (i.e., more than one type described a trajectory) (Schuh, 2000).

Of the 336 knowledge construction links identified, 134 (40%) included acting experience trajectories and 107 (32%) were related to a school context. In addition, 113 (34%) of the knowledge construction links included some indication of the affect/emotion (A/E) trajectory type, making it the second most common trajectory type in the data (Schuh, 2000). Given the prevalence of the A/E trajectory type in our data and that affect/emotion plays a critical role in the knowledge construction process, we explore this trajectory type and its role in the learners' knowledge construction process.

In this paper we first describe the nature of the A/E trajectory type, providing examples of the number of ways in which it was apparent in the data. Then, we explore how A/E associations serve as an affordance for the students' knowledge construction efforts in these classrooms. Finally, we describe the dialectic affordances that occur within the classrooms.

Methodology

Participants

Three sixth grade classrooms (74 students ages 11-12) participated in the study. These classrooms were selected based on differences in student perceptions of learner-centeredness as measured by the Learner-Centered Battery (McCombs, Lauer, and Peralez, 1997) from a pool of six classrooms from four schools in three mid-western communities. Table 1 provides a summary of these three classrooms.

Table 1
Summary Description of the Three Selected Classrooms.

	The Students in Classroom A	The Students in Classroom B	The Students in Classroom C
Learner-centeredness	least learner-centered	nearly learner-centered	most learner-centered
Number of students	24	24	26
Subject matter unit	Biomes	Roman Empire	Middle Ages
Predominant instructional strategy	small group work and presentations by students	note taking strategies	a variety including literature reading, play writing, craft project
Observation	10 times (1 hour class periods) over 2 week period	8 times (30 minute class periods) over 2 1/2 week period	21 times over 7 week during integrated subject unit
Student interview	10	6	10

Procedure

Data were gathered in the three selected classrooms through observation, student interview, teacher interview, a writing activity, and classroom artifacts. Each classroom was observed during a subject matter unit. Students were selected for semi-structured interviews following observation sessions by one of two selection methods. First, students who shared a comment or question that appeared to draw on prior experience and knowledge were selected for an interview. If no comments were observed during a session, a student was selected randomly. In the open-ended independent writing activity conducted at the end of each unit (for which students had the opportunity to use their textbook or notes as a reference), students were asked to begin their writing with the subject matter topic but were told that they could then follow other connections that came into their minds. The teacher was interviewed following the data collection for his or her classroom.

Analysis

As an instrumental case study, the focus of the analysis was to understand a phenomenon of interest: the use of prior experience and knowledge in students' knowledge construction efforts. In the analysis process, these knowledge construction links were first identified and categorized using cue and trajectory types that emerged in a pilot study conducted the previous year (Schuh, 1998; Schuh, 1999). These cue and trajectory types were expanded and clarified based upon the current data set.

Analysis continued for the current smaller study using a subset of data: those knowledge construction links that included the A/E trajectory type. These data were submitted to further analysis, seeking further descriptions of the particular trajectory type and also the context (environment) in which they were embedded.

Findings

Indicators of Affect/Emotion Trajectories

Although described as a single trajectory type, the A/E trajectory was identified in four ways. First, affect/emotion (A/E) trajectories were readily identified when students used affect words (identified by word). For example,

> I would hate to run 5 miles in gym because the gym teacher is so mean. I am very glad I'm leaving this school because it is so boring. (writing, Classroom A, March 26, 1999)

> I wasn't really here that much over this chapter. I don't think I will do very good on this test. That reminds me of my first little league game. I was so scared at first, but I actually did pretty good. I hope I do as good on the test as in that game. (writing, Classroom B, April 20, 1999)

> The thing about the reports we gave I liked one move but the others I didn't. Also, I liked the ones that did some action instead of just standing there at the podium and reading off of note cards (Classroom A, March 26, 1999).

The second indicator of A/E trajectory in our data was students' describing an emotional topic or experience such as death, illness, etc. (identified by topic). In the following example, the student describes her experience with divorce.

> I just thought about what I was going to do this weekend. Because my parents just got separated so [pause] probably going to go to my dads and I have to go to counseling tomorrow night, for court order stuff (Interview, Classroom A, March 17, 1999)

In the third type, affect/emotion appears without using an affect word. This is communicated through verbal and written punctuation (e.g., using an explanation point or talking louder and faster). In observation and interview data these were captured via researcher description.

This paper is better than school work! That's for sure! (writing, Classroom B, April 20, 1999)

"That ruins the whole book when they are nice to the bad people, like in Cinderella, where they forgive the bad person," Tracy exclaimed about the prediction that was made. (observation, Classroom C, April 15, 1999)

The final indicator of A/E is through a conceptual description (e.g., explaining something so that it implied that they were excited or bored) (by description). Notice in the following example that, although there are no explicit affect words, one comes away with a sense of uneasiness.

. . . this is a test. Everybody is too quiet, pencils tapping. It's weird. . . (writing, Classroom C, May 20, 1999)

Many A/E trajectories were characterized using a number of these indicators. The following two excerpts are A/E by topic and by punctuation.

There was also problems such as (during the Middle Ages) fleas and the cold. Even in castles! I used to let my cat sleep on my bed. She had fleas and they jumped off her. When I slept I would get dozens of flea bites. Never again will she sleep in my room. (writing, Classroom C, May 20, 1999)

At the rate I am going, I won't live to be thirteen! I have been sick with a virus, a cough, a cold, and pink eye in the last week! (writing, Classroom C, May 20, 1999)

In this writing example, A/E by word, topic, and punctuation are included.

I know someone who not only believes in ghosts, but WANTS to be abducted by aliens. She thinks it would be cool to see them, and she thinks Scream was funny (which kind of was if you think about it). It wouldn't have been if the plot was better and the blood more realistic, but when the killer is dragging the bloody and mutilated body, it was obviously a mannequin. Of course if it was real I sure would not be laughing, but that hardly ever happens. All these movies are about serial killers, but there are hardly any in real life. Movies also make it seem like aliens are bad guys and automatically want to kill us. That is why I like the twilight zone episode where aliens come and there is this huge council (to kill or not kill) and earth decides to blow up the spaceship. But then a guy is walking among the debris and finds a piece of paper that says "The cure for cancer is . . .," and is burned off right there. (writing, Classroom C, May 20, 1999)

There were a variety of ways in which A/E become evident in this data set. However, this analysis process only considered A/E as a trajectory type, i.e., a descriptor of a path that the learner encountered. Questions remained about the expanded role of A/E as a cue and, therefore, affordances.

Affect/Emotion as Affordance

We were interested if these A/E trajectories followed cues that could *also* be characterized as affect/emotion. In this, we believed that the cue itself could serve as an affordance to an A/E trajectory, thereby providing a sign that prompted further meaning-making based upon an emotional component itself. The cues preceding each A/E trajectory were identified and characterized to see if emotion or affect was implicit in the cue itself. In our analysis, we found that not every A/E trajectory was preceded by a cue with A/E. For those that did not, A/E was simply a component of the prior knowledge that had been evoked (i.e., only appeared in the trajectory). In addition, we also found incidents of cues that appeared to be primarily emotional. In one type the cue word itself was an affect word (identify by word). An example of this is the cue "bored."

Our group did a game show so that the kids watching us wouldn't get bored. A lot of times class is always boring. (writing, Classroom A, March 36, 1999)

In this example, the student initially describes the presentation that had recently been completed for the biomes unit in science class. His group didn't want the other students to be bored. This affect word (bored) was the cue that prompted a trajectory where he further described the classroom as being boring. The student continues talking about aspects of the class and what made it boring (beyond their current biome presentations). In fact, this student provides a metacognitive analysis of this stating, "we lose interest and its harder to learn." Thus, the emotional environment of the classroom as reflected through this cue is not an affordance for learning. However, it is a cue for meaning-making. Unfortunately, it is perhaps not the meaning that we would hope a student makes of the classroom experience.

We believe that the second cue type is best captured through a semiotic description. From this perspective, a cue itself is a sign (identify by interpretation). The cue, as an uninterpreted object, is not considered as affect/emotion (e.g., a tornado), but for a particular individual, the cue serves as a sign that is interpreted. That interpretation carries meaning. In our analysis, we concluded that the meaning was in large part, emotional.

In the following example, a student describes tornados and references the feeling of fear she associates with this topic based on prior experience. Then, she continues with another prior experience, also related to her feelings of fear.

When I was little I always got afraid if there was one [tornado]. I still feel that way some time because, I don't what to get hurt some happen to me. Which I remember last year I was in the hospital because I got very sick and I had to have surgery. but I knew I would never get hurt or sick

again and that was a promise to me to never do or get it again (writing, Classroom A, March 26, 1999)

Thus, the cue would be considered an affordance to A/E relevant knowing because of the particular meaning it holds for this individual, and thus, the cue is considered to have an A/E component in this case. The object is more than an object (a tornado, which she first mentions as an aspect of a biome she describes). It exists for this learner as a sign and thus provides her own personal meaning. But to know this, we need to look beyond the mere term (or its typically "objective" description) and consider how this individual responded to the term. Thus, A/E becomes an affordance in a learner's knowledge construction efforts. The meaning is larger than the incidents in the environment imply.

Given our understanding of A/E as an affordance in the students' knowledge construction efforts, we considered what characteristics of the three different classroom environments also served as potential affordances that fostered use of A/E. Given the role of emotion in learning, this seems to be an important aspect to consider in learning environments.

Classroom as Affordance

Of the 113 identified incidents of A/E trajectory types, only 12 (11%) of those occurred overtly in the classroom (i.e., identified through observation). Twelve A/E trajectories were also identified in the interview process. The majority (89 incidents, 79%) of the affect/emotion trajectory types occurred in the writing activity. We were curious about the context in which the overt A/E comments were embedded, particularly the teachers' response to the incident.

Overt affect/emotion trajectory types only occurred in two of the three classrooms: the least and the most learner-centered. The least learner-centered classroom (Classroom A), was actually teacher-centered in that the teacher was an information provider or specifier of appropriate information. Learning, as indicated by the students' actions, was finding information and pursuing performance goals, with content learning reserved for the review and a recall and recognition test at the end of the unit. There was open dialog in the classroom about the learning activity, but it was very convergent generally in that there was rarely discussion of the content. And, the dialog was closed to some students. The teacher modeled few knowledge construction links. In this classroom, where the learning activities focused around development of small group presentations on the biomes, all A/E trajectories identified during observation occurred when the students were working in small groups—unmediated by the teacher (Schuh, 2000).

The nearly learner-centered classroom (Classroom B) was also teacher-centered with textbook as single information source and teacher as model and moderator of how to extract the correct information. The instructional strategy left little room for divergent dialog or unauthorized information as the students sought information from their text to copy into their notes. The teacher, who was warm and encouraging to the students, shared his own knowledge construction links; these were generally links about good study skills rather than content. Learning in this classroom was conceptualized as the process of retrieving correct information from the source and then producing it later through recall and recognition. However, in this classroom, there were no A/E trajectories identified in the observation data. Generally, in this classroom, students censored the links that they shared. The norms of the classroom, communicated by both the teacher and students in interviews, had established that it was not appropriate to go "off-track" (Schuh, 2000).

The most learner-centered classroom (Classroom C) fostered a knowledge construction process that used individual prior experience and knowledge of the students and the teacher. In this classroom, the teacher was a facilitator, placing much of the responsibility of teaching on the students. Learning was understanding information that came from a variety of sources, that was challenged and then synthesized. Learning was also sharing of these syntheses so others could understand as well. Dialog was open and divergent, acceptance for a variety of ideas and linking efforts, including the teacher modeling a variety of links. In addition, integration of prior experience and knowledge emerged through design in that the teacher provided relevant experiences for students. In the most learner-centered classroom, all except one of the seven A/E links were in small group discussion of literature books that the students were reading on the Middle Ages. Although the teacher moderated the group discussion, she did not direct the content of the discussions following a structured agenda, but rather, facilitated the discussion by using the students' comments to highlight main points of the content (Schuh, 2000).

The manner in which the teachers responded to students' knowledge construction links provides an indicator of the degree to which a student may feel safe in sharing a personal knowledge construction link, and in particular one that has an A/E component. One example of this affordance for expression of student voice is through the teacher's response.

Following the link. In the initial analysis of the knowledge construction links, the reaction following the link was characterized. Although reactions to each link were not captured because of the noise and the fast pace of the discussion in the classroom, five categories of response to overt trajectories emerged. The link was 1) treated as an error (should not have been shared at that time or at all), 2) ignored, 3) acknowledged (a brief statement that was an appropriate comment in some way), 4) respected and validated (accepted as a meaningful part of the conversation), or 5) integrated (used to build further understanding of the issues and ideas, as in theory building). Because the teacher was not involved in the small group discussions in Classroom A, there were no teacher reactions to the comments. In the Classroom C none of these A/E trajectories were considered errors. Although some of the A/E trajectories may have been ignored (or the response not captured), when the teacher

responded, the response acknowledged the comment, but not necessarily its affective nature. For example, a student in Classroom C read her reaction to a Middle Ages novel and covered her face with her notebook in embarrassment when she read that Jesus was the Son of God. The teacher supported the student's comment, stating that it was her [the student's] opinion and that's what she had been asked to write.

In another example, this teacher strongly supported a student's affective statement. The topic of the comment was lost in the background noise of the classroom. The girl had stated what she was "really interested" in the book, and then added the following disclaimer, "but that has nothing to do with anything," discounting her own comment. The teacher supported and encouraged her interest stating "but it has everything to do with everything."

In many of the A/E trajectories that first occurred in observation, it was not clear that they were A/E based on this observation data alone. Only with expanded description through student interview did A/E become apparent.

Affect not evident. Emerging from the analysis of this small set of overt A/E trajectories was the lack of evidence in the observation data alone for this type of characterization. For a majority of these examples, the A/E characteristic only became apparent during the student interview following the observation. For example, students in Classroom C were discussing an historical fiction book set in the Middle Ages. One girl offered a prediction about what would happen in the book. "That ruins the whole book when they are nice to the bad people, like in Cinderella, where they forgive the bad person," Tracy exclaimed about the prediction that was made. (observation, Classroom C, April 15, 1999).

Tracy was chosen for an interview based upon her Cinderella comment, an example of a knowledge construction link where she drew upon her prior experience and knowledge to build the analogy. In her interview there is more evidence for this trajectory to include an A/E trajectory type.

"I don't know. When I'm in literature I just try to think of other things because lots of the sheets she gives us says try to think of other experiences that match with the book and, um, we were just making predictions, and we were saying, 'Oh, the uncle is going to come crawling back to Evan when he learns to read.' And that's sort of like Cinderella, and well, I said that Evan was going to forgive him and that's sort of like Cinderella forgiving her evil step sisters." She continued, "You know I've related a lot of them to Disney movies, and everybody, sort of like, makes fun of me and stuff, but,"

"How come?" I interject.

"It's just sort of Disney movies, you know," she explained.

"I like Disney movies," I said perhaps leading her.

"I like them, but I don't really watch them anymore because, I don't know, I usually watch comedies or something and um, and those just have a lot of things in them and they're a lot of experiences in different movies that relate to books. Personally, I like the books better than the movies that are made from them."

"I think a lot of people end up saying that."

"Yeah, my favorite book is *Jane Eyre* and I watched the movie, I didn't really like the movie that much," Tracy said. (Tracy, age 11, interview, Classroom C, April 15, 1999)

In her interview, there are a number of indicators that this is A/E trajectory that was not apparent in the classroom. Tracy liked Disney movies (identify by word). In addition (and perhaps more important), people made fun of her now for watching them (identify by topic or description). Her comment to the class about Cinderella was a very risky statement on her part. In addition, the student who spoke prior to Tracy provided a cue for Tracy's link. This girl had predicted a happy ending with the bad person being forgiven— an A/E cue by word and interpretation.

In an April 29, 1999 observation, Nicole shared her reaction to a different Middle Ages novel. The students were to write a reaction and dialog from the perspective of a pilgrim on the journey with the book characters. Nicole referred to the bible saying that "doesn't it say something about not hating each other. If she [the girl in the book] was a person living today I think she would definitely travel around the world."

In the interview, Nicole provides a much more involved description about her writing when asked what had made her think of that comparison in the first place.

"I don't know, I was just, 'cause I, I don't know you just, oh boy, um, well you can tell that Eleanor was tense about it and she had been told stories that the Moors were evil and they carried knives in their pants and so, and by the report I did, Ferdinand wanted to start the cleansing of Spain and so the Moors weren't particularly happy with the Christians and the Christians were weren't [she corrected herself] particularly happy with the Moors and so I put, I thought it was different that Eleanor really didn't hate the Moors. I mean, if it were me, I'd be scared to death, running off, 'Oh my God, he's got a knife, he's going to kill me' [she said in a higher voice] but Eleanor was just so calm and, and then it occurred to me that she can't really hate him can she, 'well why couldn't she hate him?' 'Oh, duh, she's Christian.' You can't really hate anyone even though

people say you really do hate them." (Nicole, age 12, interview, April 29, 1999)

In this added description the A/E component of Nicole's literature assignment becomes more apparent. It includes A/E by topic and by punctuation.

In the least learner-centered classroom (Classroom A) students in the saltwater biome group were seeking to understand the depth and size of the ocean so that they could share the information in the required presentation in which they would teach their classmates about their biome. Boats were discussed (cued by a picture of a tanker in an encyclopedia) and the Titanic in particular (being something at the bottom of the ocean). In the students' discussion, these were largely void of obvious affect. However, in the interview, the A/E component was identified by topic (i.e., pain).

> "Yeah, I was talking about the oil tankers. We were trying to figure out how many gallons of oil were pumped out every year and I said, we could also list different kinds of oil tankers and boats that are in the ocean. Just as, I don't know, I had an idea," he trailed off sounding somewhat apologetic. . . . "Well, 'cause most, well we're looking through the encyclopedia and we saw that it was showing oil, that most of the oil was on, in the ocean. So, I said we ought to list, or see if we can find how many gallons, or whatever, are pumped out each year or something. We looked through it and we actually found it. I guess we just, because it, basically it maybe an important resource from the ocean, it's just one of those things," he explained.

> "What do you know about oil tankers and stuff?" I asked.

> "Let's see, they're very big, of course. Most of them, or some of them, never mind, I won't even say that, some of them get caught up or they wreck, but um, they have lots of people on them. They drill into the ocean surface, people can get hurt on them sometimes, maybe from the oil. That's all." (William, age 12, interview, Classroom A, March 16, 1999)

Further, in William's writing he commented on his interest in the movie *Titanic*, including his favorite part where a guy hit the propeller (identify by topic).

In these and other examples, it was not evident through observation alone that the information expressed by the learner had an A/E component. Unfortunately, a brief overt statement is often the only information that the teacher has to rely on and, as a result, the meaning that a student takes from the classroom experience is only partially known to the teacher. Given the few number of overt A/E incidents that occurred in the classroom it would seem that the classrooms do not provide affordances for the use of these potentially meaningful components to the learning process.

Further, when they did occur, the information provided by the student was often limited and not readily identified as A/E so that a teacher may use it to foster further understanding. However, we found that the writing examples of the students were richer in the A/E trajectory (79% of the A/E trajectory types).

Learning Activities to Foster A/E Related Meaning-Making

Given the richness of the writing data, as well as the opportunities for dialog within the classrooms that served (or did not serve) as affordances for the use of A/E trajectory, a variety of activities and assignments implemented in a learning environment may offer affordances to prompt learners to share meaning that is linked with A/E components, thereby increasing meaning-making itself. For example, the writing activity in this study was very unstructured, thus allowing learners to follow tangential topics or express their personal voice. Although some of these tangents may not have aided in the understanding of a canon of subject domain topics in that the links were far removed and the learners did not juxtapose the information but merely transitioned from one topic to another, the process provides opportunities and permission for learners to express A/E links and can provide an opportunity for sharing their personal meaning. This type of open-ended activity communicates to the student that his or her personal voice is of value to the community.

Activities such as assignments that provide for perspective taking as implemented in the most learner-centered classroom, journal writing (which also occurred in this classroom), as well as small group discussion among students, and student focused dialog as facilitated by a teacher also provided these opportunities. Thus, a focus on learner-centeredness to allow for the students' experiences, perspectives, backgrounds, etc. (that will include affect/emotion components) and open activities that allow expression of these are critical. Further, these activities need to provide an opportunity for students to take risks without repercussion—particularly considering the personal voice may be a vulnerable voice.

These activities do more than allow students to express or explore their personal links and associations, they also create an environment that values and utilizes that information in creating meaning. When this occurs, student perception gains power as part of the classroom environment. We believe that these instructional strategies can be affordances for learners to share their understanding based upon prior experience that also allows affect and emotion to have a role in that meaning-making process.

Conclusion

In this paper we discuss indicators of affect/emotion as appeared in our data, and describe use of cues and trajectories, and note the important role of the teacher in creating an environment which can serve easily as an affordance to A/E

avenues. Of interest were trajectories initially identified as A/E. These were identified by: 1) choice of words (e.g., I like, I hate, I love); 2) topics that were considered emotional (e.g., death, illness, self-esteem or worth); 3) punctuation (e.g., ! or voice inflection), or 4) description (e.g., describing happiness, sadness, fear, anger, etc. without using the affect words). Often, A/E trajectories contained more than one of these identifiers. The cues were further considered to see if they themselves were also A/E in nature. Although not all A/E trajectories were preceded by A/E cues, two types of A/E cues were identified: 1) by word (e.g., like, boring) and 2) by interpretation or sign (i.e., by a personal interpretation of a seemingly non-A/E cue that recasts it as A/E for that particular learner). Thus, in this second cue type, the A/E cue is an affordance for meaning-making.

One goal of this paper was to create a dialog about the importance of these A/E affordances in the learning process. Although this study focused on only three classrooms, it is clear that the prior experiences on which these students drew in their learning contains A/E cues and trajectories. However, we wish to clarify the avenues through which these affective and emotional characteristics appear in this data are not necessarily assumed to be pure avenues. In other words, the cues and trajectories themselves may not be the things that facilitate a learning process that embraces the role and necessity of affect in learning. However, after reviewing the incidents of A/E components in the classroom environments in which they were identified, we believe that creating a safe environment where students are invited and encouraged to enhance their meaning-making through their own affective/emotional process is a critical component. It seems that we are more adept at creating intellectually and physically safe environments for learners than emotionally safe environments if the lack of affective cues and trajectories in the classrooms is an indication. To address this issue, we believe that the next step is to identify existing instructional environments that foster A/E affordances in the classroom so that they can provide models from which more general guidelines may be drawn.

To further develop dialog on this issue, we also see a need to increase teacher awareness that A/E cues and trajectories exist in the learning environment, are a primary part of students' personal meaning-making, and greatly impact what and how students learn. This may easily be accomplished by individual or groups of teachers audio or video taping their classrooms and reviewing the tapes with an ear towards identifying A/E cues and trajectories in the classroom dialog and activities. Then, reflecting on the cues and trajectories and how they relate to their own students' learning. In addition, we recommend that teachers reflect on their own personal relationships with the subject matter content. Teachers articulating personal A/E trajectories that are linked with the subject matter content via cues add richness to the learning experience of their students. These examples not only provide models of A/E trajectories that may prompt

students own personal trajectories, but also indicates that the environment is safe for these types of interactions.

In addition, there needs to be a concern on the part of educators for those environments that do not foster this interaction. In other words, what if a teacher video tapes his or her classroom and it seems that there are no A/E trajectories that are allowed to be followed? If this phenomenon should be naturally occurring the meaning-making process, then identification of what is constraining these efforts is worth while as well as considering the implications that this constraint may have on the learning process. What is replacing this natural A/E aspect of learning and does that replacement foster a safe environment for learners?

Finally, we considered the classroom environment in which these cues emerged and whether that environment itself was an affordance for the particular type of trajectory used in a meaning-making process. In this, the most learner-centered classroom, although having the most general support for fostering the use of prior experience and knowledge as evidenced through overt knowledge construction links (Schuh, 2000), did not seem to foster the use of A/E links. Although the few links that were offered were accepted, it was often not possible to identify these as A/E links based on the students' brief comments in the class alone. Thus, knowing if the meaning a learner is making has an A/E component that could be fostered to develop a richer understanding in content learning is not apparent to the teacher. Therefore, further study of the classroom culture may be warranted.

However, based on the number of A/E trajectories that occurred in the writing activity, we speculate that activities with open structure—such as journal writing, perspective papers, and open dialog among students, may increase the affordances for use of affect/emotion components of prior as well as current experience, to support learning.

References

Burbules, N. C. (1993). *Dialogue in teaching*. New York: Teachers College Press.

DeCatanzaro, D. A. (1999). *Motivation and emotion*. Upper Saddle River, NJ: Prentice Hall.

Estes, W. K., and Skinner, B. F. (1941). Some quantitative properties of anxiety. *Journal of Experimental Psychology*, *29*, 390-400.

Gibson, J. J. (1996). *The senses considered as perceptual systems*. Boston: Houghton-Mifflin.

Greeno, J. G. (1998). The situativity of knowing, learning, and research. *American Psychologist*, *53*(1), 5-26.

Lakoff, G., and Johnson, M. (1999). *Philosophy in the flesh*. New York: Basic Books.

Lubert, T. I., and Getz, I. (1999). Emotion, metaphor, and the creative process. *Creativity Research Journal*, *10*, 285-301.

McCombs, B. L. (1997). Self-assessment and reflection: Tools for promoting teacher changes toward learner-centered practices. *National Association of Secondary School Principals Bulletin*, *81*, 1-14.

McCombs, B. L., Lauer, P. A., and Peralez, A. (1997). Researcher Test Manual for The Learner-Centered Batter (Grades 6-12 Version) . Aurora, CO: McREL.

Noddings, N. (1994). Conversation as moral education. *Journal of Moral Education*, *23*(2), 107-118.

Peirce, C. S. (1985). Logic as semiotic: The theory of signs. In R. E. Innis (Ed.), *Semiotics: An introductory anthology* (pp. 1-23). Bloomington, IN: Indiana University Press.

Schuh, K. L. (1998). *Knowledge structures from a constructivist perspective*. Paper presented at the International Conference on the Learning Sciences, Atlanta, GA.

Schuh, K. L. (1999). *Multidimensional knowledge structures*. Paper presented at the Association for Educational Communications and Technology, Houston, TX.

Schuh, K. L. (2000). *Exploring the connections: Knowledge construction in the learner-centered classroom*. Unpublished doctoral dissertation, Indiana University, Bloomington.

Wagner, E. D., and McCombs, B. L. (1995). Learner centered psychological principles in practice: Designs for distance education. *Educational Technology*, *35*(2), 32-35.

Wicklegren, W. A. (1997). Idea roles, idea families, and the syntax of purposive cognition in the cerebral cortex. In W. A. Wicklegren (Ed.), *Cognition and Neuroscience* (pp. 1-17). New York: Wicweb press. Http://www.columbia.edu?~ww50/.