

"Ecologizing" Instruction Through Integrated Units

Sasha A. Barab

Well, a lot of hard work along with a little frustration has proven to pay off. The first team of five has completed its unit and I am beginning to feel like we are finally accomplishing something. The teachers enjoyed creating as well as implementing the unit. The students were also very enthusiastic about the unit, and they were quoted as saying "we really understand this stuff." To make things even more rewarding for all involved, there was a write up in the local newspaper today. The teachers were proud of the students and the work they have done to receive such recognition. The principal was also very pleased. Something good is happening in his school, and now the whole city knows about it. (Abrahamson, 1996, appendix)

The above quote, taken from a graduate student doing her internship on integrated units, captures the enthusiasm for and the success of work at Quirk Middle School to implement these units. Reflecting back on this work over the last three years, we (see author's note p. 28) have learned many lessons regarding the successful implementation of integrated units. There were times of frustration (e.g., when one of the teams involved in the project decided to discard its theme 10 weeks into the semester) and times of joy (e.g., when the students listened to the album they recorded about civil rights broadcast on a local radio station or, as captured in the above quote, after our first write-up in the local newspaper). Overall, the project was considered a great success by the over 30 teachers and 400 predominantly Hispanic and African American inner-city students involved. One teacher was quoted in the town paper as saying: "It was a wonderful experience. They [the students] were very excited about it." An interview with another teacher revealed that one student turned himself around after having his picture in the town paper: "He went from doing no work to completing all his work." It was as if the experience helped him to find a new enthusiasm for learning. Further, our understanding of the challenges

inherent in implementing integrated curriculum evolved, potentially strengthening the project for the coming academic years. The challenges included finding a happy medium between full-scale integrated units representative of real-world experiences and meeting the practical constraints facing classroom teachers (e.g., improving standardized scores; covering district-mandated content; 50-minute class periods). In this article I share my experiences and insights with respect to the development and implementation of integrated units. Specifically, the perspective being advanced is that one should view the central hub as an *anchor* with the potential to ecologize the learning situation. The notion of ecologizing the learning situation around an anchor refers to instruction that fosters a context in which "content" comes to take on uses that are consistent with how students would use the content outside of schools.

Separating Content from Context

A common belief held by educators, researchers, and policy makers is that knowledge can be described in terms of specific objectives and imparted with little recourse to the communities of practice who value it (such as mathematicians, scientists, and journalists who use the resources and practices as part of their everyday

Sasha A. Barab, an interdisciplinary consultant at Quirk Middle School, is an Assistant Professor of Instructional Systems Technology at Indiana University, Bloomington.

activities) or to those situations in which it is valued and learned. This sets up a "content-culture incongruity" in which students are expected to appreciate content implicitly framed by the culture of schools, but whose value and function is explicitly attributed to the cultures of mathematicians, writers, scientists, and so on (Brown, Collins, & Duguid, 1989). Without legitimate access to the authentic situations and communities in which the content is valued, an exchange value replaces the value of increasing participation and knowledge use (Lave & Wenger, 1991). Content is transformed from useful tools for interacting with the world to abstract symbols to be memorized (Dewey 1938/1963; Lave & Wenger, 1991). Tests constitute one of the most common means of establishing an exchange value for knowledge, in that learning to display knowledge for evaluation can be exchanged for high grades on tests.

Central to this line of reasoning is an objectivist epistemology, in which it is assumed that facts, concepts, principles, and skills are independent of those communities and situations in which they are learned and used. In other words, the context in which one learns is perceived as simply a transparent medium in which to introduce the content, and this context is somehow independent of the content one learns. These

To ecologize instruction means to introduce content in a manner that is consistent with how students would use it outside of schools.

assumptions, coupled with the need to impart objectives in the most efficient manner possible so that students will score highly on standardized tests, have led to didactic pedagogical approaches in which the all-knowing teacher simply tells passive learners what they need to know (Jonassen, 1991). This objectivist perspective underlies much of what occurs in K-12 classroom instruction, and has led to an emphasis on the teaching of abstract facts, concepts, and skills. This process places the cart before the horse, giving students "knowledge" with little insight into its real-world application.

Ecologizing Instruction

The notion of ecologizing instruction refers to the process of placing abstract content back within its *authentic* contexts, referring to those contexts outside of schools in which the material serves a functional purpose (Barab, Cherkes-Julkowski, Swenson, Garrett, Shaw, & Young, in press). This notion, although rooted in the work of Dewey (1938/1963), can be more recently tied to theories of situated cognition in which it is argued that, "knowledge is situated, being in part a product of the activity, content, and culture in which it is developed and used" (Brown et al., 1989, p. 32). This process allows students to gain an appreciation for the uses, in their own lives, of the content they are studying and applying. For example, graphs have been deemed important curricular content because of the functional role they serve in making apparent various phenomena in the world. Outside of schools it is the phenomena they represent that make graphs so valuable; however, in schools, graphs are frequently taught as self-sufficient items with the phenomena they represent as ancillary, and frequently of little interest to the students expected to appreciate their importance. In contrast, the goal for integrated units is to support students in making connections: connections among disciplines, connections among content and those situations in the real-world in which they have value, and connections among what is being learned and their own lives. This is evident in the insight expressed by Schubert (1994):

Suddenly, these literary works were not just the stuff of assignments, bridges to credentials. Instead they were currents in a river that could help me shape a more meaningful life. From that point onward I assessed each new course as an opportunity to grow, because I found reason to hope that therein I could find insights and perspectives that addressed some of my most valued questions. (p. 28)

In our integrated units, we have attempted to introduce instructional activities that are consistent with those activities that students care about outside of schools. Further, their reasons for carrying out the activities within schools should be consistent with those reasons that motivate them to engage in those activities

outside of schools (Greeno, 1997). For example, in our Students' Rights Unit, students were expected to generate a bill of rights that was representative of the views of students in the school. In carrying out this unit, students learned about percentages and graphs in a context of determining various group preferences which is consistent with why one might use percentages outside of schools. Students also composed songs in which they expressed issues related to rights and empowerment that they found important to their own lives.

Making connections between the content of the integrated activities and their lives was evident when the students were told that the songs they had written were not going to be performed by the band hired due to a contractual dispute. At first, the students, when hearing this disheartening news, felt victimized and expressed only anger and disappointment. However, these students so appreciated the importance of advocating for personal rights and empowerment that they advocated for themselves, stating that they had been given a verbal contract. In one student's words, "Martin Luther King wouldn't have given up, neither will we." They then used the resources they had (desks as drums, their voices as "back beats," singing acappella) and those the school would provide (space for recording, quality recording equipment, funds to produce tapes for each student, time during the day) so that they could produce their album. For these students, "what is fundamentally curricular and what is fundamentally human are of the same fabric" (Schubert, 1994, p. 26). In other words, as students adopted and met various goals, they *embodied*, not simply *acquired*, the content and practices associated with different domains. This embodiment transformed how they perceived and interacted with the world.

Similarly, students working on personal/historical maps perceived this unit as a means for understanding themselves in relation to Hartford's history. This was accomplished in part by students choosing to interview relatives and old timers in Hartford. Further, this unit was developed so students did not learn mapping and compass skills through didactic instruction, rather they learned these skills in various contexts, in an attempt to navigate to specific locations—reasons that are consistent with why they, and others, would use the information outside of schools. For students participating in the integrated units, knowledge was

Figure 1

Contrasting Interdisciplinary, Integrated, and Multidisciplinary

Although our conception of "interdisciplinary" units, in which an anchor constitutes the central hub (Barab & Landa, 1997), is consistent with Beane's (1996) description of "integrated" units, I selected the latter word in communicating to an outside audience who might view interdisciplinary units as not being integrated. However, I think that many of the lessons discussed by educators as interdisciplinary (see Jacobs (1989) for example) would fit Beane's (1996) conception of integrated. A more useful distinction is between integrated or interdisciplinary and what has been called multidisciplinary curriculum (Beane, 1996; Jacobs, 1989).

developed and applied to address the current problem rather than in preparation for some later test or to meet district-defined objectives.

Why Do Integrated Units?

As students progress from elementary to high school, content and practices associated with different subject areas become departmentalized. Disciplines are taught by different teachers in different locations, with students moving from one room to the next. As a result, studying physics is very different from studying chemistry. In one student's words: "Math isn't science, science isn't English, English isn't history. A subject is something you take once and need never take again. It's like getting a vaccination; I've had my shot of algebra. I'm done with that" (see Fogany, 1991, p. 61). The segmented, discipline-based approach facilitates the attainment of specialized skills and concepts central to a particular field of study. However, these delineations do not reflect the reality of life outside schools (Beane, 1991,1996). The world does not contain problems that are discipline-specific and solved within regimented time-blocks. Rather, the everyday activities that occur outside of schools draw on principles and tools associated with a variety of disciplines.

In contrast to the segmented disciplinary approach, interdisciplinary (Jacobs, 1989) or integrated curriculum (Beane, 1996; Lounsbury, 1996) emphasizes connections. The goal becomes to arrange content around overlapping concepts and themes, not to help students remember isolated facts. According to Jacobs (1989, 1991), the process involves applying language, principles, and methodologies associated with

more than one discipline to address a central problem, issue, or project—frequently referred to as the hub or organizing center. While the separate subject and multidisciplinary approaches are organized around subject-based content and



skills, integrated approaches are characterized by, "organizing centers that contextualize knowledge and give it sufficient meaning" (Beane, 1996, p. 7) (see Figure 1).

Integrated units connect disciplines via the central hub, which is designed to provide legitimacy to the content being learned (Barab & Landa, 1997). For example, in the Students' Rights Unit where students worked on the student bill of rights, they first passed out a survey and then used percentages and graphing calculators to infer what rights the different groups deemed most important. Here percentages and graphs were tools that allowed students to address a meaningful problem. In the Personal/Historical Map Unit, students developed personal/historical maps of their city. They learned about latitude, longitude, and scale because it was necessary for the design of their maps. Common to both these examples is that *the completion of the project— not later test scores— validated the importance and use of the content being learned*. In this way, "curricular content" becomes a tool for addressing a meaningful problem, not another set of facts to be memorized. The distinction between content and context becomes blurred, with the content (i.e., graphs, percentages, latitude, scale) simply being part of the learning context. Studies have indicated that students in integrated

programs do as well or better on standardized tests, show greater writing improvement, and feel significantly more bonded to teachers and to the school than do students in conventional programs (Hough & St. Clair, 1995; Sadowski, 1995). In my own research teachers have continually indicated that during these units students appeared more motivated, wrote more than usual, and were more willing to talk openly with the teachers about other aspects of their lives. In one teacher's words, "he not only applied himself more to his work, but also took risks, and shared personal information about his life outside of school." A mathematics teacher involved in one of the units commented that students who rarely participated took a more active role in mathematics because they saw it as a necessary step to completing a project of interest to them.

Choosing the Organizing Center or Anchor

I have found it useful to think of the organizing center as an anchor. "A curricular anchor is a complex problem that the student acknowledges as worth solving and that validates the learning of a set of relevant skills and concepts" (Barab & Landa, p. 53). The concept of an anchor was introduced by the Cognitive and Technology Group at Vanderbilt (CTGV) (1990). Their extensive research suggests that anchors can help students learn techniques, facts, and ideas in long-term transferable ways. Careful selection of anchors can help students learn the "whats" in a manner that also provides insights into the "whys," thereby, ecologizing instruction.

Anchors are usually multistep, complex situations that require students to generate subgoals and determine what information is necessary to satisfy the requirements of the situation. Although anchors, as conceived by the CTGV, have referred to stories in which a problem is introduced, we have found it useful to extend the notion of an anchor to include projects and issues out of which problems and activities naturally emerge. For example, Barab and Landa (1997) discussed a project in which students designed an AIDS unit, importing the scientific information they needed through guest lecturers, videos, and field trips, while concentrating on the historical and communications aspects of understanding and preventing the disease. The

students prepared two AIDS curricula, one for younger students and the other for their parents. In this unit, the anchor (that is, developing the AIDS unit) sets up a *macrocontext* in which students used concepts, practices, and resources associated with a variety of disciplines to develop their curricula. The CTGV (1990) contrasted the notion of a macrocontext, in which one establishes an overall context from which subtasks emerge, from the individual sets of questions (microcontexts) frequently listed at the end of textbook chapters.

Beane (1996), referring to the organizing center of an integrated unit, suggested that curricula should be "organized around problems and issues that are of personal and social significance in the real world, usually identified through collaborative planning by teachers and students" (p. 6). Schubert (1994, p. 30) stated that, "curriculum integration can be achieved best when an organizing center lies at the heart of human concerns and interests." Organizing centers, whether they are problems, issues, or projects, need to be meaningful to students, establish an overall macrocontext, and their completion must require students to employ principles, practices, and resources associated with a variety of disciplines. Although anchors can be invented or natural, it is important that they fulfill four requirements:

- capture the imagination
- be perceived as important by learners and teachers
- accommodate a variety of learning approaches
- ecologize the disciplinary content they integrate (place abstract content within an authentic context).

Developing Anchors that Ecologize Instruction & Address Standards

The process of ecologizing instruction has proven to be the greatest challenge to the development of successful integrated units. I found many teachers to be more comfortable with organizing learning activities around pedagogically structured content than around meaningful problems/issues/projects that provide authenticity to the material being learned—unless one considers grades or scores on standardized tests to be legitimate reasons for learning the material. Although teachers found the opportunity to engage in developing integrated units intuitively appealing, they were nervous about the possible impact on standardized test scores. In response to this concern, I have found it useful to engage

in the following four steps when developing units.

1. Identify those sections of the standardized tests with which students are having the greatest difficulties.
2. Generate a list of those situations outside of schools in which concepts, practices, and resources tested in these sections are used.
3. Have teachers and students identify which of those situations are of greatest interest to them.
4. Design an integrated unit in which one of the situations, or an approximation thereof, serves as the anchor.

In other words, the goal is to select anchors in which the activities necessary for an acceptable completion require students to engage in practices using resources that are consistent with district objectives. In these units the sequencing of activities is not organized around content and skills, but is "managed by relevance to the problem at hand" (Beane, 1996, p. 7). For example, in developing the student bill of rights assignment

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we first examined the particular mathematics, history, science, and writing skills as well as concepts and facts listed as school objectives. From these, we generated a list of real-world situations that were important to students and were representative of those situations in which students would, potentially, apply the content being learned. One of the teachers suggested that students had been frustrated with their lack of rights and that a unit supporting students in developing a bill of rights might prove exciting. Creating a student bill of rights would require the ability to collect data, analyze results, interpret and present findings, write a persuasive essay, and ground the argument in the larger historical and political framework. More importantly, students would be learning these skills and this content as tools for developing their own bill of rights. It is this latter practice of introducing the content, practices, and principles as tools for addressing personally meaningful issues (not as abstract facts) that ecologizes instruction and that should guide the selection of anchors.

Reflections on the last Two Years

After a two-year period of involvement in the development and implementation of integrated units, it has been a rewarding experience for the individuals who have taken the opportunity to participate. The school administration, 32 teachers, and other staff members have been able to develop positive relationships internally as well as with

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individuals outside of the organization. This is not to imply that everything has been perfect. We have certainly had to deal with growing pains over the last two years. Below is a list of the successes and challenges documented while teams participated in the development and implementation of integrated units.

Successes:

1. Teachers and administrators were exposed to new instructional strategies. This exposure created options for the improvement of teaching and learning. Many of the classroom teachers had read about and even begun to develop what they described as "interdisciplinary" units. However, as they shared their experiences, it became apparent that these lessons were more consistent with notions of multidisciplinary units in which similar themes are discussed in classrooms associated with more than one discipline (e.g., reading about whales in English, measuring how many whales could fit in the auditorium in mathematics, and studying the biology of whales in science). As we discussed, the notion of anchors and their role in legitimizing the content, teachers gained an appreciation for the differences between multidisciplinary and integrated units. One teacher even found that thinking through these distinctions prompted her to question the validity of how she was teaching content in her non-integrated units.
2. Clusters/Teams generated a common cause for

planning instruction as a team rather than as individuals. Teachers noted that previously planning time focused more on student discipline and administrative functions than on curricular issues. They found these new discussions on finding ways to legitimize course content invigorating and appreciated having the multiple perspectives. They also found it useful to learn what other teachers were doing in their classrooms.

3. Students generally displayed a higher interest in classroom activities and viewed the classroom activities as meaningful. Students who had previously demonstrated little interest in curricular activities got more excited and involved partly because they could see the importance of the content they were studying. In fact, one of our tests in determining whether the anchors were working was to randomly ask students why they were working on the activities in which they were engaged and examine their self-reported motivations. Most students stated that they were addressing problems and tasks associated with the anchor as opposed to receiving a grade on a test,
4. There was an increase in other educational practices, such as cooperative learning and problem solving. One of the exciting outcomes about establishing rich learning contexts around the curricular anchors was that their completion frequently involved working collaboratively on problem-solving activities that extended over time. We found that students had little prior experiences with collaborative group work. Teachers indicated that "helping students to develop collaborative skills was an added bonus of the integrated units."
5. There was an increase in the amount of networking with outside resources. This generated interest and involvement from the local community. This included partnerships with surrounding universities that were excited to work with classroom teachers in developing and implementing the integrated units. Relations also extended to outside groups such as the staff at a nearby park who helped students develop map skills for their unit on personal/historical maps. One other exciting resource for these lessons were the parents who came to the school to examine and give invaluable input into the student projects.

Challenges:

1. Initially, teachers needed to leave their classroom for additional training. This included allocating funds for substitute teachers and finding times for teachers to develop and locate resources for their integrated units. In order to carry out the planning, teachers had to move beyond their normal preparation periods and other activities had to take a back seat to the integrated units. Even with this investment in training, many teachers still had trouble discriminating between what constitutes an integrated unit and a multidisciplinary unit. To address this need, we are currently exploring the production of videos depicting teams of teachers implementing various units ranging from multidisciplinary to integrated. Similar to previous work earned out by Duffy (1997), these videos will be available on a CD-ROM allowing teachers to study the practices in detail. The teachers will be able to pause the video and obtain three different perspectives on the teaching activity they are studying: those of the teacher in the video, those of a teacher educator, and those of an educational researcher. In addition to the video database, we envision a conceptual database, containing articles and video clips organized around conceptual issues.
2. Teachers created pressure on themselves to complete the development and implementation of their integrated units. On several occasions this included trying to integrate lessons that were better taught within the context of the individual classrooms. Further, even when some of the anchors proved to be less fruitful (due either to lack of interest of some of the team members or inability to assemble the necessary resources) teachers had trouble abandoning previously invested work and moving on to a more productive anchor.
3. Many of the lessons developed centered on what was practical, opposed to authentic problems that were central to the students' lives and interests. This was probably our largest challenge. For example, one group did a unit on space because of a teacher's connection to the space center. However, this experience held little interest to some of the other teachers in the group, and many students perceived the profession and experience as unrelated to their daily concerns.

Concluding Thoughts

There are many reasons for implementing integrated units, for example, aiding students in making interconnections among subject areas, learning generic skills (e.g., problem solving, problem posing, integrative skills, collaborative skills, interpersonal skills), or finding personally meaningful entrance points to the curriculum. In one teacher's words, "When working on these units in which students saw the use of the mathematical formulas, some of my less able students were outperforming the more able ones." Another teacher commented on how the musical component (i.e., writing and performing songs) provided an entry point to the unit for one normally reluctant student.

However, from my perspective the most exciting opportunity and challenge of integrated units is their potential for ecologizing instruction; that is, connecting curricular content with its real-world function. Such an emphasis helps students, as well as teachers and administrators, appreciate the relevance of content, methodologies, and practices associated with school disciplines. Working towards this goal has forced my colleagues and me to question both what and how we teach. In terms of the former, we have found ourselves more closely examining the content being taught in terms of its potential for expanding students' ability to interact with their world. With respect to the latter, it is those activities that are consistent with how the content is used outside of schools that are promoted. This is not

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to imply that good teachers are not implementing these types of activities all the time, only that it is a natural outcome when one develops integrated units centered around carefully designed anchors.

I have learned many lessons over the last couple years and find myself looking forward to the challenges ahead. One challenge, which I believe must become central to the development of future units, is to involve students in the task of

selecting anchors and designing the units. It has primarily been the teachers who have had the task of interpreting what will be relevant to students and what students will need to apply in their later lives. In an attempt to increase personal ownership and levels of intrinsic motivation, I now believe that students should, at some level and in some way, be involved in the selecting of topics and the development of these units—topics need to reflect student experiences, not those of the classroom teacher or district-defined objectives. Educators need to develop "a willingness to turn themselves over to these young people rather than to the abstract subject categories and artificial purposes that have plagued schooling for so long" (Beane, 1991, p. 13).

I concede that these units are time consuming, and their difficulties have no easy solutions (Lounsbury, 1996). However, teachers continue to develop these units in spite of the time it takes. In fact, all teachers who participated in the development of integrated units the first year elected to develop new units during the second year. They did so for several reasons: these units were refreshing, they brought the teacher's creativity into play, they enabled teachers to collaborate imaginatively with colleagues, and they were a reliable way to welcome all students into the circle of successful learners. D

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