Running head: DESIGNING LEARNING FROM DAY ONE

Designing learning from day one:
A first day activity to foster design thinking about educational technology

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Abstract

In this paper, we discuss the pedagogical and practical purposes of the first day of class as they apply to design-based educational technology courses. Arguing that "real instruction" doesn't have to wait until the second class meeting, we introduce our philosophy behind a set of first day activities called "Apollo 13" that serve to introduce the course by encapsulating the big ideas of the course into an hour-long micro-design activity. We describe the Apollo 13 activity (with examples of student work) within the context of our "learning technology through design" approach and show how this activity successfully encapsulates the key ideas of our teaching philosophy. We conclude by discussing the primary contributions of the Apollo 13 activity, and how the ideas presented in this paper might apply more broadly beyond the design-based educational technology courses.

Introduction

Over the last few years, we have been aggressively designing and studying an innovative approach to helping teachers become effective users of educational technology. Our approach, *learning by design*, has emphasized the learning that occurs when teachers work in groups to design educational technology. Although this approach has provided teachers excellent opportunities to consider the deep relationships between pedagogy, content, and technology (Koehler, Mishra, Hershey, & Persuski, 2004), *learning by design* has also posed some interesting issues and challenges to us as course designers. One of the key challenges we have faced is how to design the first day of class such that teachers come away with an accurate introduction to the novel approach we use in class. In facing this challenge, we have designed a class of first-day activities (that we call Apollo 13 tasks) that we have found useful for introducing the course. Although these tasks were created to introduce students to the learning by design approach, we believe that the principles they embody have wider applicability to other domains.

Before describing the Apollo 13 activities in detail, we introduce a number of ideas about the role of the first day of class, outlining the multiple goals that course designers should consider regardless of content area or instructional method. Then, we briefly describe the *learning by design* approach, highlighting the important aspects of the method that are unique, and therefore deserve careful introduction on the first day approach. Following this introduction, we describe the Apollo 13 activities and show how they encapsulate the principles of the *learning by design* approach, and how these activities serve as a useful introduction to our courses. We conclude by discussing the main contributions of this activity, and how the ideas presented here apply more broadly (beyond design-based educational technology courses).

The Importance of the First Day of Class

> "'The partial, often misleading impression the teacher makes
> at the beginning of a course may establish the attitude,

> response, and even the tempo of the class for the rest of the term." (Eble, 1988, p. 34)

The first day of class is an important one for teachers and students alike (e.g., McKeachie, 1986; Wolcowitz, 1984; Serey, 1989). Students expect that the first day of class will be used to introduce fellow students and instructors to one another. They also expect to learn more about the course in the form of a detailed syllabus, reading list, grading criteria and the expectations and requirements of the course (Hilsen, 1988; Johnson, 1988; Lyons, Kysilka, & Paewlas, 1999; McKeachie, 1999). That is, students expect little more from the first day beyond covering the points in the syllabus and routine introductions, assuming that "learning" officially starts when the class meets for the second time.

When teachers fall into this trap of accepting this canonical enactment of the first day, they overlook the importance of capitalizing on what is really important about the first meeting (Higgins, 1999). First impressions, they say last a lifetime. When students come to class on the first day, they come with a sense of uncertainty and anticipation about what the upcoming course will be like. Impressions formed on the first day of class often linger through the semester—setting the agenda, as it were, for what comes next. Simply introducing the syllabus and self-introductions do little to set the flow of the class for future meetings since these activities are never repeated.

Hence, instructors would do well to consider how the first day is used to impart the mood of the class, the role of humor, the personalities of the instructors and students, the normative instructional activities in the class (lecture, projects, etc.), and the roles that instructors will play both in and out of class (Davis, 1993; Higgins, 2001; Provlacs, 1986; Scholl-Buckwald, 1985). These first impressions are particularly important when we consider non-traditional courses that do not take the usual lecture-discussion approach (such as our approach of "learning technology by design"). In such courses it becomes important that the messages being communicated emphasize how this particular course is different from other courses. The first class then becomes a site for informing the students that this course is not "business as usual" and that the expectations, tasks and degree of participation are different from what they are used to. In courses such as these the importance of first impressions is even greater than in more standard higher education courses.

We argue that an effective, motivating, informative, and efficient means for managing the first day is to use a first day activity that *encapsulates* the course. That is, instructors should use first-day activities that embed the roles for students and instructors, the pedagogical features, the assessment rubrics, the ebb and flow of instruction, content, collaboration expectations and the mood that will be used throughout the term of the course. In other words, the role of the first day activity is to present, in an interesting way, some activity or project that captures the essence of the course.

Clearly, an appropriate first day activity that encapsulates the course needs to be unique to the demands of the content, and the course framework. There is no generic, one solution that would work for each and every course. What this means is that prior to introducing the activity we need to offer a brief description of the course within which it works. Offering students a perspective on the course becomes particularly important when the course is a non-traditional one. We have utilized the first day activity to introduce our courses on learning technology by design, which is described in the next section.

Learning Technology by Design

Many students come to educational technology courses expecting to learn specific skills (how to create web pages, how to use digital video etc.) and specific software products (Microsoft Frontpage, Adobe Premiere etc.). However, there are two critical problems with teaching specific technologies or skills. First, the rapid rate of technological change ensures that any knowledge gained about specific technologies or software programs would quite quickly become out of date. Second, such learning is often de-contextualized, lacking connection with broader issues of technology integration with actual classroom practice.

Over the past years we have faced this dual challenge (of obsolescence and de-contextualization) by situating the learning of technology within the context of *design*. Though the idea of learning by design has been used for years in disciplines such as architecture and graphic design it is relatively new within educational technology. Design-based classes involve working collaboratively on solving authentic problems rather than on lectures and demonstrations. The "learning technology by design" approach often conflicts with student expectations and prior experience.

Design lies in an area that touches upon a variety of disciplines—science, technology, psychology, art to name just a few. It is this multidimensionality that makes the act and process of design so important and so complex. The idea of design is particularly important in the arena of educational technology, where we try to bring the logic of technology to the world of learners and their minds. The ultimate goal of these courses is not just learning technology, but rather, changing the way our students view themselves with respect to technology. Educators need to see themselves not as passive users of technology, but rather as active designers of technology, who creatively re-purpose tools, technologies, and artifacts to meet their own goals and desires. At the heart of the learning technology through design courses is the goal of moving away from instrumental conceptions of technology towards developing a flexible, context sensitive, learner driven approach towards technology. As we have argued elsewhere (Koehler, Mishra, Hershey, & Persuski, 2004; Mishra & Koehler, 2003), an important aspect of learning to use technology for teaching requires developing a different mindset towards technology. This mindset is characterized less by an emphasis on learning specific tools than by developing flexible strategies for thinking deeply about the role of technology in the educational process. Our approach is loosely based on the "design studio" model that is an integral part of most design professions such as architecture, graphic and product design. In these courses there is little or no direct instruction about technology but rather students become masters of their own fate as they work (either individually or in groups) to design educational technology artifacts.

The ill-structured and complex nature of design makes it difficult to teach. There are no overarching laws of design that apply across all cases and there are no context-free uses of tools (software or hardware). Our design-based approach rejects functional fixedness with respect to tool use and emphasizes the value of seeing each design problem as a unique context for applying technology, pedagogy and content knowledge. Clearly these ambitious goals are not something that can be achieved by lecturing alone. (See Mishra & Koehler, 2003; and Schon, 1983 and for extended arguments for why design is difficult to teach.) The best way *to teach design* is by having students actually *do design*. So students in our courses, work on design problems, seeking technological solutions to open-ended problems. We call our approach "learning technology by design" and have applied this approach to a range of different design tasks. The design projects that students have produced have varied from semester to semester, but have included creating digital movies on educational topics, redesigning educational web sites, and developing online courses for the college of education (Koehler, Mishra, Hershey, & Peruski, 2004; Mishra & Koehler, 2003; Wong, Mishra, Koehler, & Siebenthal, in press). What is common to all these activities is that they force students to look at the tools they have in terms of their inherent constraints and affordances and asks them to think carefully and creatively about how to leverage these to meet their design goals. We provide little direct instruction about specific technological tools and in fact rarely specify the tools or computer programs students ought to use. Instead students are expected to learn how to use these tools as and when required by the task at hand.

Most students in educational technology courses are not familiar with the idea of design studio or design-based activities. Thus, starting with the first day of class, it is important for the instructors to help students understand the course goals, activities, and norms that will be happening throughout the semester, especially considering how different this course will be from their prior experiences. One way that has been recommended for teaching ill-structured domains is by introducing students to "byte-sized chunks of complexity" (Mishra, Spiro, & Feltovich, 1996; Spiro, 1988/1994); i.e., mini-contexts that capture the richness and the complexity of the entire domain (Hofstadter, 1987). We see the Apollo 13 activity as a rich mini-case that captures some essential qualities of the design process.

The Apollo 13 Activity: The Course in a Microcosm

Chris Kraft: "This could be the worst disaster [we've] ever faced."

Gene Kranz: "With all due respect, sir, I believe this is gonna be our finest hour"

(from the film, Apollo 13)

We named the activity after the famous episode in NASA history. On April 13, 1970 the Apollo 13 space mission made a memorable call in to ground control: "Houston, we have a problem." In the days that followed, the astronauts and NASA had to design a solution to a problem on limited time and resources in order to save the astronauts. A team of astronauts and engineers on the ground was charged with helping the astronauts in space by developing a solution to the problem they faced using just the materials the astronauts aboard the Apollo spaceship had available. Moreover they were working within an extremely tight deadline. Failure to come up with a solution would lead to tragic consequences. With teamwork and hard thinking, the Apollo 13 ground team was able to develop a solution that the astronauts could use.

The Apollo 13 activity we use on the first day of class shares some key characteristics with the NASA episode. Though, clearly, the consequences of failure are not as severe. When students walk into the classroom the first day, they are not offered the usual introductions to the instructors and the course. Instead participants are sorted into groups and are handed a set of instructions and tools for completing a short communication/design activity within a specific time frame (usually an hour). Once the instructions are given, the instructors step out of the way and let the groups work on the project.

There are many different ways in which the Apollo 13 activities can be instantiated and we offer some examples of different versions we have tried in our courses along with examples of students' work that emerged from these exercises.

One variation in the Apollo 13 exercise is to provide different topics to each group while keeping the media the same. For instance, in a course about designing online courses, all the Apollo 13 groups were asked to create standalone Powerpoint presentations designed to teach different skills or concepts (see Figure 1 for the instructions given to the groups). In this activity, the groups met in a computer lab with standard lab software and Internet access, and each group was given a computer diskette, and a digital camera to complete the assignment.

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"As a group, you have one hour to complete the following task. Please read the instructions and start working."

(Each of six groups was provided with a blank diskette, and given a different task as follows)

Group A	Group B	Group C
Design a presentation to teach someone the idea of "evolution."	Design a presentation to teach someone how to throw a frisbee.	Design a presentation to teach someone how to check email using their university account.
Group D	**Group E**	**Group F**
Design a presentation to teach someone what it is like to be blind.	Design a presentation to teach someone the names of US states and corresponding state capitals.	Design a presentation to teach someone how to interpret a poem.

"You must use Powerpoint to complete your project. You may also use the digital cameras provided as well as any other resources (online or otherwise) that you can find. Your presentation should be 'stand-alone' – it should contain everything needed, and you will not be able to explain what you have constructed. At the end of one hour, you should hand your diskette containing your presentation to the instructor.

Figure 1. Instructions given to students in "Powerpoint tutorial" version of the Apollo 13 task.

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The solutions that the groups provide vary widely, but each group produced a tutorial within the allotted hour (See Figure 2). The discussion of the various solutions is used to introduce some key ideas about designing instruction for the online world – in this case, teaching facts (e.g., the capitols of the 50 states) is different from teaching procedural knowledge (e.g., throwing a Frisbee) or conceptual knowledge (e.g., the theory of evolution or the process of interpreting a poem). In terms of using technology the groups often incorporated images from the Internet and paid attention to the manner in which images and text relate to each other (in particular see the Powerpoint presentation on interpreting poetry).

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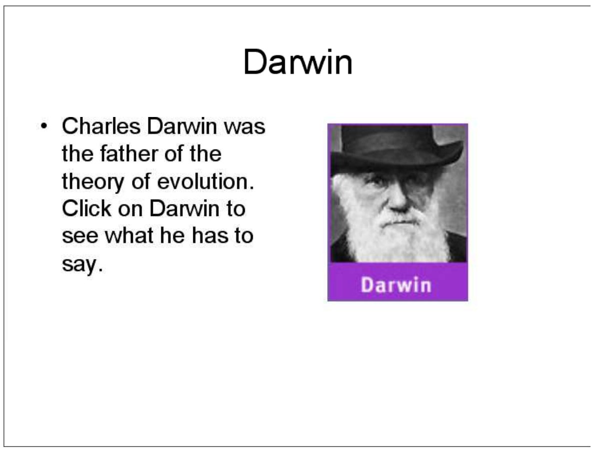

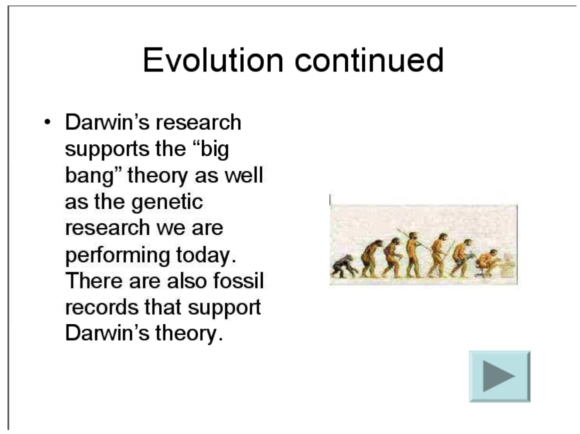

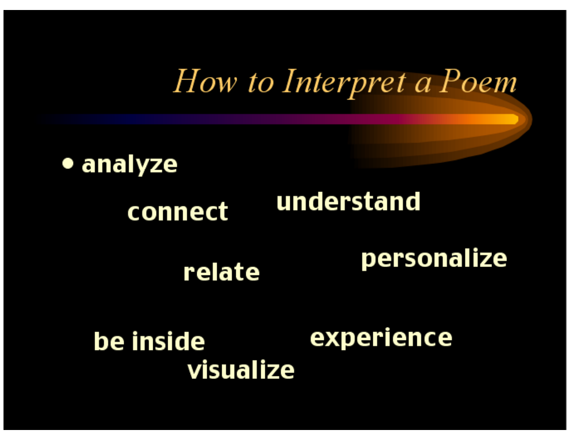

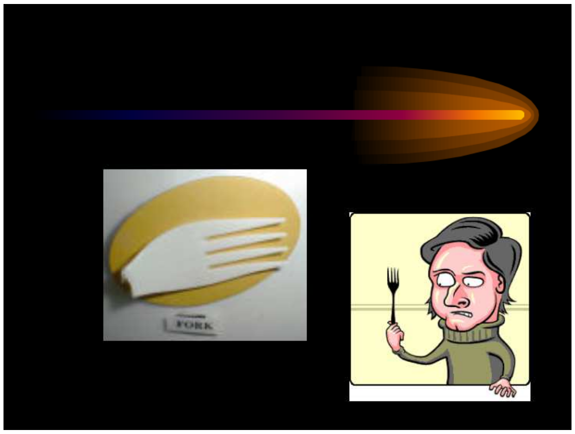

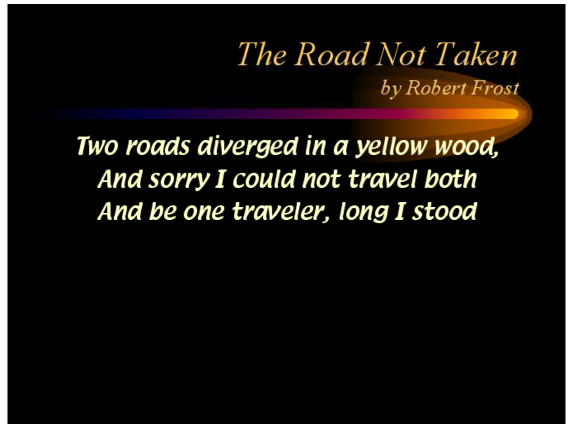

Figure 2. Sample slides from two different Microsoft Powerpoint presentations one designed to teach the idea of "evolution" (two slides) and the other to teach "how to interpret a poem" (the next four slides).

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Giving different topics while keeping the technology constant (Powerpoint, in this case), undermines essentialistic thinking about technological tools and underscores the fact that the nature of the content to be covered influences the manner in which a tool can, and should, be used.

An alternate form of the Apollo 13 task we have tried is to keep the task the same and vary the media that the groups could use. For instance, in another course students were asked to create an artifact that represented their "love of knowledge," but this time they were given different media to work with. These varied from Microsoft Excel, to construction paper, to Microsoft Powerpoint (see Figure 3). By keeping constant the idea to be communicated this version of the Apollo 13 task emphasizes the many different ways in which a single concept can be covered and the manner in which media influence the kinds of design decisions we make.

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"As a group, you have one hour to complete the following task. Please read the instructions and start working."

(Each of six groups was provided an envelope that gave them all they needed to complete the task. All the groups has to teach the idea of "evolution" but were given different tools.

Group A	Group B	Group C
Design a presentation to teach someone the idea of "evolution." You can use Microsoft Powerpoint	Design a artifact to teach someone the idea of "evolution." You can use the cans of Play Doh included in this packet	Design a presentation to teach someone the idea of "evolution." You can use the construction paper and glue included in this packet.
Group D	**Group E**	
Design a presentation to teach someone the idea of "evolution." You can use Microsoft Word.	Design a presentation to teach someone the idea of "evolution." You can use the paper and markers included in this packet.	

Your artifact should be 'stand-alone' and self-explanatory. It should contain everything needed, and you will not be able to explain what you have constructed. At the end of one hour, you should be ready to present your work to the class.

Figure 3. Instructions given to students in different media to represent the same idea, version of the Apollo 13 task.

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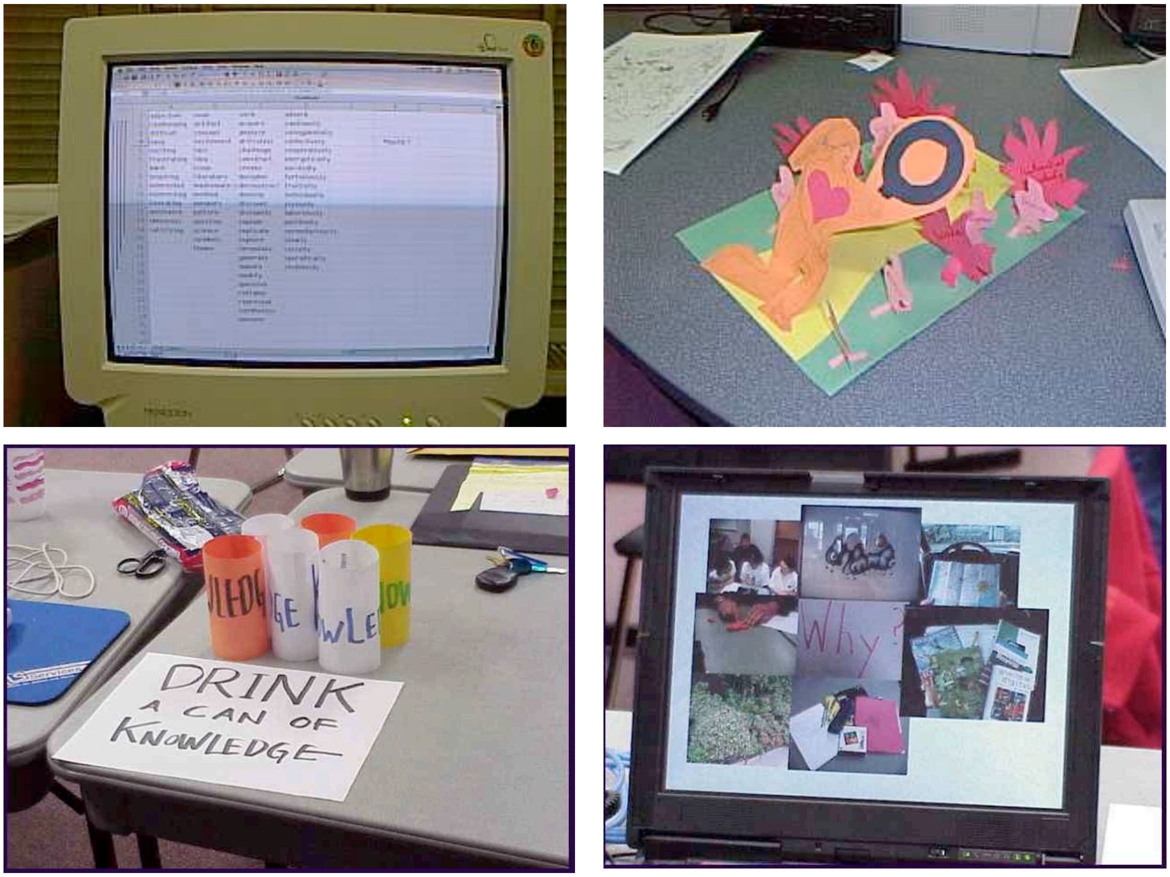

Figure 4: Four artifacts created by student groups to demonstrate their love for knowledge using different media. Clockwise from the top-left, the materials used were Microsoft Excel, construction paper, Microsoft Powerpoint, and construction paper.

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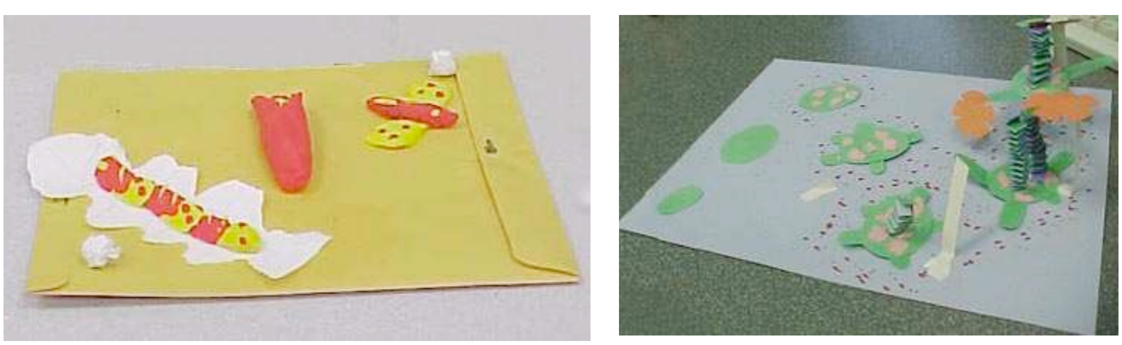

Figure 5: The artifacts created by two groups to communicate the idea of evolution. One group used Play-Doh to show the various stages in the life-cycle of a butterfly. The second group used construction paper, scissors, markers and glue to depict the evolution of a complex three-dimensional creature from a simple two-dimensional shape.

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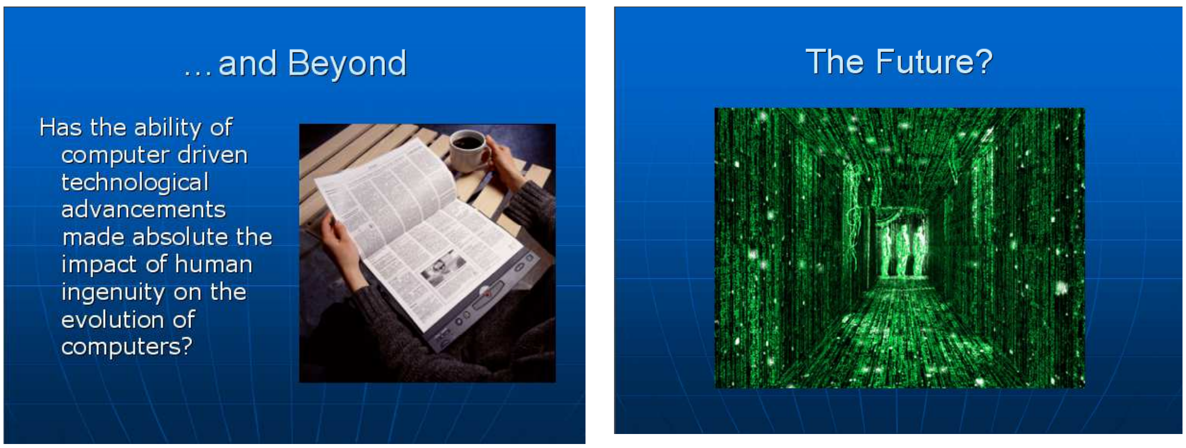

Figure 6. Powerpoint presentation to explain the idea of evolution. Compare this solution to Figure 5 and Figure 2. Note how this solution differs from the solution to an identical design problem offered in Figure 2.

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In a similar activity we asked students to construct artifacts to represent the idea of evolution with different media. (Since the instructions provided were quite close to the example above we merely show the artifacts created by the students. See Figure 5.) As in the previous case they were given different media with which to construct these artifacts (such as playdoh and construction paper, markers, scissors and glue. Note how the different groups dealt with the idea of evolution (Figure 5). The groups provided Playdoh attempted to express their thoughts on evolution by showing the different stages in the life of a butterfly. They laid out the "sculptures" they had created in a circle to emphasize the cyclic nature of this process. Another group who had been given construction paper, glue and scissors took another approach altogether. This group created a complex, and evocative representation of the *idea* of evolution through this abstract sculpture. The structure they created began with a two-dimensional blob that gradually "evolves" into a complicated three-dimensional structure.

Compare these two examples with Figure 6. In this example (taken from a different semester) students were given the same task (explain the idea of evolution) but this time with Powerpoint. It is also interesting to compare Figure 6 with Figure 2. Note how in the current example the group chose to go with the idea of technological rather than biological evolution, indicating that there are often multiple solutions to design problems and that these solutions are related to the media being considered.

The topics the students are given can vary a great deal. In contrast to abstract topics such as "love for knowledge," or "evolution" other iterations of the activity have been concerned with more concrete goals. For instance one semester we asked students to create invitations to the final presentation for the *Learning by Design* course (Figure 7). As you can see students using playdoh, and construction paper developed extremely creative solutions to these problems. In contrast the solution developed by the group using Microsoft Word was quite mundane and clichéd.

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Figure 7: Invitations to the final class-presentation designed by three different groups. The first is made with Play-Doh, the second with construction paper, scissors and glue and the third using Microsoft Word. Note that the one created with Microsoft Word is the least creative of the three solutions.

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In these versions of the Apollo 13 activities, different groups received different tools with which to work (while the communicative goal was kept constant), or different groups received the same tools to work with while the communicative goals changed for each of them. Clearly there are many more permutations and combinations possible. Regardless of the task assigned or the materials provided the groups share an experience with the real Apollo 13 mission—they were faced with an unexpected problem that had to be solved within a predetermined deadline. Furthermore, the tasks are usually ill-structured, in that there are no pre-determined recipes the students could follow. Reaching a solution required a mix of knowledge, ingenuity and teamwork.

What happens in class

When first faced with the Apollo 13 task, our observations indicate that groups are at first overwhelmed by the difficulty of the task, the severe time pressure, and the fact that they often do not know each other. The tight and looming deadline, however, pushes individuals (and the group) into action and they begin to introduce themselves to each other and start brainstorming possible solutions. The groups often discuss different possibilities and solutions and get to work. Some students sit at computers while others talk or write or begin playing with the materials.

Within each offering of the Apollo 13 task, we notice great variety in how the groups approach their mission. In some groups certain individuals take up leadership positions, assigning tasks to people and to themselves. Other groups tend to evolve a more distributed management system. The scope of the task leads groups to split-up their responsibilities, usually based on self-described skills and strengths. Towards the end of the hour, the groups often come together around one person who is sitting at the computer or by the artifact design, offering suggestions and feedback. By the end of the hour the groups present what they have to the larger class group.

It is important to note that as groups show their solutions for the task, they are not allowed to tell the class just what topic and media had been assigned to them. They are usually not allowed to describe what they have constructed. The idea is that the artifact has to speak for itself. This presentation is followed by a brief discussion about the activity and its relevance to the overall course. It is only then that the standard first day activities (the introductions to the faculty and students, presentations of the syllabus, discussion on course requirements and grading procedures) get covered.

The Multiple Affordances of the Apollo 13 Activity

Once the activity is completed and students have presented their work to the class, the instructors step in for the first time. We use this activity to initiate a discussion on the reasons for doing the Apollo 13 activity and how it foreshadows larger issues we will explore through the semester. This discussion allows us to introduce the content (*what* will be covered), and the pedagogy (*how* the content will be covered). In the next section we would like to highlight some of the ideas and issues that the Apollo 13 activities lead to. Some of these issues are explicitly discussed while others are implied more implicitly. We can identify four key themes that arise in the whole class discussion: (a) Introduction to the course; (b) Introduction to the idea of design; (c) Developing a learning community; and (d) The relationship between ideas, technology and creativity. We describe each in turn.

Introducing the class

The Apollo 13 activity *presents to the students a typical day in the life of the class—both the content and the process*. In the discussions after the activity we point out to students that "content" of the course is identical to the content of the Apollo 13 activity – working at the intersection of technology and pedagogy. Likewise, this is also an introduction to the "process" of learning to be used throughout the course– with an emphasis on hands-on collaborative problem solving.

The Apollo 13 activity also *introduces the instructor to the students.* Students get a sense of what the instructor is like, what the instructor values, and what kind of classroom this instructor has designed. They realize that a "learning by design" classroom is driven not by lectures or direct instruction but rather by the students as they work on solving design problems. Working together for an hour to meet a tight deadline in the process of solving a difficult and complex task also forces participants to get to know each other.

More important than the personal introductions may be the manner in which the Apollo 13 activity *introduces the ethos and mood of the class*. What this means is that the Apollo 13 activities help students see that hard work, cooperation, fun, and humor are going to be part of the course. Not only is the work of creating the Apollo 13 presentations fun and playful, so are the discussions that occur afterwards. Humor naturally arises in the group situations and the classroom discussions, partly as a function of the nature of the tasks assigned. This establishes a classroom ethos, one based on experimentation, self-directed learning, and play. Students find the activity challenging, fun and motivating. Moreover, fun does not mean that the course is easy or superficial. The Apollo 13 activity also tells the student that *learning begins on day one.* From the minute students walk in the door, they are immersed in a learning activity. Hence, they begin to learn about the course, what it means to design, and what it means to learn.

Introducing design

The Apollo 13 activity *introduces students to the idea of design, design as process and product.* Even in the short while that the students work on the Apollo 13 activity they realize that there are no straightforward and predetermined ways to solving ill-structured problems. Solutions have to be developed through an *iterative process of negotiation and dialogue*. This dialogue has many forms, it can be between the individuals in the groups, but more importantly it is a dialogue between materials and ideas, between concepts and realizations. This aspect of how the materials “talk back” (Schon, 1996) to the designers is closely related to the idea of design being a process of negotiating with multiple constraints to develop creative solutions.

The Apollo 13 activity emphasizes *the value of creativity* by having students develop creative solutions to difficult problems. The Apollo 13 activity is difficult because the participants work under multiple constraints (time, media, expertise, familiarity with each other and so on). Scholars of creativity have often argued for the value of constraints in fostering creativity (Elster, 1992; Hofstadter, 1987; Koehler & Mishra, 2002). This is often very clear at the end of the Apollo 13 presentations when we compare the final artifacts. Very often it is the most difficult ones such as using Play-Doh to create an invitation for the final presentation of this course, that are the most creative and appealing. In contrast, the solutions generated by relatively obvious tools (such as MS Word), are often clichéd and not as interesting.

Finally, students learn that, despite this emphasis on the *process* of design, what counts, at the end of the day, is the *product*, the artifact finally presented. *This artifact has to stand on its own, independent of the creators,* since the designer is rarely there to suggest how it would work. The user is the final arbitrator of whether a design solution succeeds or fails. This is emphasized in our activity by preventing our students from describing what they have created. Students are often surprised to see just how differently people sometimes interpret what they have constructed. This also underscores the value of user-testing and cyclic nature of design—i.e. repeated iterations of applying user feedback to the redesign of the artifact. Though the Apollo 13 activity does not provide enough time for redesign based on feedback, this is something emphasized in the class discussion (and in the course as a whole).

By choosing tasks that are either very concrete or extremely abstract and pairing them with different media students are forced to consider *the relationship between ideas, media and representation*. Consider, for example, the difference between examples depicted in Figures 1 and 2, or the variation in examples from Figure 3. The relationship between content and form is not straightforward — neither drives the other, but rather they exist in a transactional relationship with each other.

Beginning to develop a learning community

Developing a sense of community is essential if classes are based on collaboration, group work, and the development of shared meanings. Apollo 13 embeds many aspects of a learning community within the activity itself, thereby imparting important lessons to students. For instance the Apollo 13 activity emphasizes the fact that *learning is a cooperative* process. This activity emphasizes from the get go the value of interaction and collaboration that are necessary for the development of a community of learners. The tight constraints that frame the Apollo 13 activity force *individuals to take on different roles* depending on their prior knowledge and expertise. These roles are rarely explicitly defined, but are often implicitly negotiated. For instance, very few groups ever explicitly nominate the "techie", or the artist, or even nominate the "group leader." The tight constraints (on time and media) force people to fall into roles that help the team, and the class, work smoothly.

The development of a learning community also happens in the context of the larger context of the course. At the end of the final presentations students realize that though the groups may have worked on different projects all the participants in the class form *a larger community united by some common goals and ideas* such as an *interest in technology and pedagogy*. Students in our course are often surprised by the many different tools and media they are provided as a part of the Apollo 13 activity. Too often educational technology is equated with the latest digital toy. However, the creative and effective use of relatively low-tech tools, such as Play-Doh and construction paper, indicates that effective use of media is not dependent on high-technology but rather on the appropriate use of available technology. We often deliberately vary the tools we provide. This leads to an interesting discussion on how prior knowledge and expectations about our tools constrain what we do. It becomes clear that this class is not about tools per se, but rather exploring media for multiple purposes -- for communication, construction, inquiry and expression (Bruce & Levin, 1997). Moreover, technology does not have simple one-way implications for education, rather the Apollo 13 activity helps illustrate that design solutions represent compromises and complex interactions amongst technology, content, and pedagogy.

Extending Apollo 13 beyond design courses

Does the approach we have presented apply only to courses about learning technology through design? We hope not. However, incorporating Apollo 13 (or other design like) activities may require some rethinking or reconceptualization of how the course content is covered. Clearly such hands-on activities are more appropriate for courses that represent content in a student-centered, dynamic manner. In that sense Apollo 13 activities are consistent with a broader trend in higher education, i.e., an emphasis on active learning. One of the tenets of active learning is that students construct their own knowledge, based on experience and social interaction, and that teaching is much more than the mere transfer of knowledge from the instructor to the learner. An active learning perspective sees development of knowledge not as a given but rather as a dynamic interaction of the learner and the content (guided by the instructor).

Teaching any subject matter in this way requires rethinking how the subject matter will be treated. It requires a move away from thinking of subject matter as being a static body of knowledge towards one that is dynamic and evolving. This process of moving from seeing content as a noun, a "dead" body of knowledge enshrined in textbooks or lectures, to a verb, a process that encapsulates inquiry, communication, construction and expression (Bruce & Levin, 1997; Dewey, 1915/1956), has been called "verbing content" (K.A. Smith, personal communication). What is ironic, is that as scholars and researchers, we rarely, if ever, see knowledge as "received wisdom" to be accepted "as is." We see knowledge in our domain as being as ever-evolving and dynamic, open to questioning and interpretation. However, we are often unwilling (or unable) to present it to our students in quite the same way. So in that sense, the idea of verbing content is nothing more than offering a perspective to students consistent with how we think and act as researchers and academics. This process, of verbing content, is the first step towards developing active strategies to engage students in deep processing of subject matter, and lies at the heart of designing appropriate Apollo 13 activities.

The next step in creating an Apollo-13-like activity for a course is to make decisions about three major messages that need to be communicated in the first day of class. First, is an impression of *what* the content of the course will be. This has to do with students forming an impression of what the subject matter is that will be covered and learned through the semester. Second, students form an impression of *how* the content will be covered. Will the class be dominated by lectures? Will it be in the form of a discussion based around readings, or projects? What is the nature of the learning community that will be formed? Finally, students form impressions of the *tone or style* of the class and the learning environment—what is the instructor's personality and sense of humor. How will the instructor handle the class? What kind of role will the instructor play? These expectations color and determine the role students see themselves playing in the class, the kind of motivation they bring to future meetings and how relevant they see what they will be doing through the semester. We offer a few examples of how Apollo 13 like exercises can be developed for courses that cover other subject matter.

To take an example from the field of education, consider the task of designing an Apollo 13 activity for a course on educational policy. The preferred method of student interaction with the course material will be reviewing relevant research, and devising policy recommendations (in written form) based upon sound empirical data. The instructor envisions most of the work of the course to be done by individuals (not a lot of group-work), and that there will be many short written assignments. An appropriate Apollo 13 activity might ask students to briefly read a few research summaries that address a current hot topic in education (e.g., the impact of earlier standards based testing on student achievement), and write a letter to the editor of the local newspaper outlining a recommended approach for the local school district. This activity would introduce students to the modal activities of the course (e.g., reading research and writing concise policy recommendations), the content of the course (e.g., by reading other students' letters, they will get a feel for the issues the course might address), and the style of the instructor (e.g., they will begin interacting on the first day and that subject matters covered in this course will of direct relevance to policy makers and interested laymen).

A variant of the Apollo 13 task that may be particularly appropriate for engineering courses is the "index card tower" task, where students work in groups to build a tower using just standard index cards. Students are given a specific amount of time to complete the task as well as specific goals, such as the tower should be at least 11 inches high and should be able to hold up a brick for up to 30 second. Various constraints can incorporated into the activity, (such as whether the cards can be folded or torn, whether tape or paper-clips can be used) depending on the final goals of the instructor. Once again the idea is to see engineering not as some knowledge to be imparted by the instructor but rather an active engagement with materials to achieve per-determined goals.

Another variant of an Apollo 13 task, this time for a course on creative writing, could be the *55 Fiction* Assignment. In this assignment students are asked to write a short story in exactly 55 words! This may seem impossible to achieve but this is a legitimate (if relatively new) genre with official competitions and anthologies (Moss, 1998). The 55 fiction assignment requires students to contend with all the aspects of writing a short story (plot, character, conflict, resolution) but all within 55 words. Students automatically learn the value of economy and parsimony, of making each and every word count (both literally and metaphorically). The instructor could have students critique each others stories and offer suggestions for improvement. Variants of the activity could involve students rewriting the story based on the feedback they received. The brevity of the task combined with its authenticity could make this task feasible, useful, engaging, fun and challenging to the students.

As must be clear by now, it is relatively easy to imagine a large number of such activities for different courses. A teacher education course may ask prospective teachers to develop a lesson plan to teach a certain topic to middle school students and so on. One is limited only by one's imagination.

Discussion

The Apollo 13 activity encapsulates within it a variety of important ideas and concepts that the students and the instructors will explore in greater detail in the weeks to come. We are not arguing that merely conducting the Apollo 13 activity on the first day means that the instructors can sit back for the rest of the semester. If anything it is the opposite. The excitement of the first day actually raises the bar for the instructors, in that they have to live up to the high expectations they have set up at the very beginning. The ideas of creativity and design have to be explored further, and the nascent learning community started on the first day needs to be supported, fostered and nurtured through the rest of the semester. Clearly the first day is important but at another level it is just an introduction to what is to happen in the weeks and months to follow. That said, the

Apollo 13 activities help set the stage, to prepare both students and instructors to an exciting journey together.

We hope that educators can apply these principles to design effective first day instruction for almost any course. The goals for doing this are to find ways to encapsulate the entire course into a shorter activity, to generate the need for it to happen (in our case, a problem to solve), to make it authentic, and to find ways that require students to work as they will work during the semester (in our case, design teams). With those goals in mind, any first day activity can be an Apollo 13 activity.

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