The Interest-Driven Learning Design Framework: Motivating Learning through Usefulness

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Abstract: The Interest-Driven Learning Design Framework (IDLDF) provides guidelines for designing learning activities that achieve the benefits of interest as a motivator for learning. The IDLDF addresses two major challenges to the implementation of interest-driven learning. The challenge of covering learning objectives is addressed by establishing relevance. The challenge of insuring enough strength to motivate learning of all learning objectives is addressed by using other forms of motivation as context motivators.

Interest

Recognizing the powerful role that interest plays in motivating learning outside of school, researchers are increasingly focusing attention on understanding how to use interest to motivate learning in school. This focus on interest represents a convergence of two different strands of research, one on constructivist learning environment design and the other on motivation. In the literature on constructivist learning environment design, researchers have argued for the motivational importance of authentic, interesting tasks and contexts in the design of learning experiences that lead to robust understanding (e.g., Blumenfeld, 1992; Cognition and Technology Group at Vanderbilt, 1992; Guthrie & Alao, 1997; Schank, Fano, Bell, & Jona, 1993/1994). In the educational psychology literature, researchers have described four benefits of interest as a motivator of learning:

Natural appeal. Interest describes a natural draw to certain activities. As Renninger (2000) describes it:

> People working with individual interests are motivated learners, in the sense that their activity appears purposeful, sustained, and ever-deepening…. People do not really need to make a choice to learn subject matter that is of individual interest to them; choice in this instance is largely an effortless process" (p. 19).

Mastery goal orientation. As Schiefele (1991) has observed, interest leads to a mastery goal orientation. When a learner perceives that certain knowledge or skills are useful to the pursuit of an interest, he or she is drawn to *master* the knowledge or skills, not just to *demonstrate* them. This contrasts with the performance goal orientation that results from sources of motivation in which the perceived value is achievement or recognition. Researchers have accumulated a considerable body of evidence showing the positive impact of a mastery goal orientation on learning outcomes (Ames, 1992; Dweck, 1986; Lepper, 1988; Meece, 1991).

Persistence and effort. Research has shown that when a student has interest in a task, he or she is likely to expend more effort and persist longer at that task. Interest has been shown to lead to more persistent motivation and greater effort in a range of learning tasks (Hannover, 1998; Nenniger, 1987; Schiefele, 1991; Wade, 1992). In a review of the research on interest and learning in reading, Hidi (1990) cites a wide range of experiments showing the positive impact of interest on engagement, attention, and learning outcomes.

More richly and strongly connected knowledge. Individual interest, in particular, carries an important cognitive benefit for learning because people have rich knowledge structures to build upon in their areas of interest. Renninger (2000) describes this as the "stored knowledge" component of an individual interest. These elaborated knowledge structures offer the opportunity for rich connections between new and prior knowledge. Studies by Schiefele (1991) and Alexander *et al.* (1995), have demonstrated the benefits of high interest and high knowledge in text comprehension and retention. The enduring quality of individual interest also implies that new knowledge is likely to be reinforced by frequent use.

With this background, we pose the question, *How can materials, activities, and social structures be designed to capitalize on interest as a motivation to learn?*

Interest-Driven Learning Design Framework

We have developed a framework for the design of learning activities that exploit the power of interest to motivate learning. We call it the *Interest-Driven Learning Design Framework (IDLDF)*. The IDLDF was inspired by the recognition that there is a different between the motivation to engage in activity and the motivation to learn. The premise of the Interest-Driven Learning Design Framework is that the motivation to learn is elicited when students perceive a reason to acquire knowledge or skills based on how they can be used. The IDLDF draws on the personal goals of learners to provide them with a reason to learn. We call the form of interest that results *interest based in usefulness*.

The IDL Design Framework addresses two major challenges to the design of interest-driven learning. The first challenge is motivating the broad range of learning objectives that are valued in our educational systems, many of which do not appear to hold any interest for their intended audience. We call this the challenge of *coverage*. The IDL design framework addresses the challenge of coverage through creating relevance for learning objectives to interests. The second challenge is accommodating the variation in the motivational strength of interests among different individuals and within the same individual at different times. We call this the challenge of *strength*. The IDL framework addresses the challenge of strength through the use of a variety of types of motivation to supplement interest.

The IDL Design Framework is the embodiment of a design theory (Edelson, 2002). As such, it is informed both by prior research and firsthand design experience. The framework draws extensively from the existing literatures on motivation, cognition, and the design of learning environments. It was created through an iterative synthesis process drawing on the research literature, analyses of existing designs for interest-driven, active learning, and our own experiences in the design of learning environments.

Interest Based in Usefulness: The Inherent Motivation to Learn

The IDLDF is based on the recognition that when an individual sees the usefulness of acquiring new knowledge or skills, that recognition of usefulness creates an inherent motivation to learn. We describe this motivation based in the recognition of usefulness as a form of interest, because we see the inherent motivation to learn as a defining characteristic of interest. In the context of the IDL Design Framework, we have a very specific meaning for the term *usefulness* that refers to the authentic use of knowledge or skills beyond the structures of the educational setting. We characterize knowledge or skills as being useful to a learner if the learner believes that he or she will be able to employ them toward the pursuit of a goal outside the educational system. This definition excludes "usefulness" for demonstrating knowledge or skills to gain approval, external reward, or advancement within the educational system. Therefore, it excludes the motivation to learn in order to perform well on classroom, admissions, or professional certification examinations. In this respect, our concept of usefulness incorporates the "value beyond school" that Newmann, Marks, and Gamoran (1996) associate with authentic pedagogy.

Within the category of usefulness, we recognize both personal usefulness and adopted usefulness. Personal usefulness is usefulness to a goal that a student holds outside the learning environment. Adopted usefulness reflects the fact that students may adopt a role within a learning environment. Adopted usefulness provides the same orientation toward learning that personal usefulness provides, though the strength and duration of the motivation may be significantly different.

Sources of Interest Based in Usefulness

In the Interest-Driven Learning Design Framework, the designer's goal is to create a motivation to learn that is based as much as possible on the learner's recognition of the future usefulness of what is being learned. Through our analysis of existing interest-driven curricula, we have identified five sources of usefulness that designers use to generate interest. They are:

Pleasure. Engaging with certain topics and activities provides people with a combination of sensational, aesthetic, or intellectual satisfaction. Hobbies, for example, are typically motivated by pleasure. When an individual recognizes an opportunity to learn something that will enhance their ability to experience one of these forms of pleasure in the future, they are motivated to learn based on the usefulness to that source of pleasure.

Concern. People value activities and outcomes that they feel are important for emotional, moral, or spiritual reasons. For example, many people are concerned about the natural environment because they feel that its preservation is important, independent of any direct implications for them. Learning outcomes that enable individuals to act more effectively on their concerns are useful to those concerns.

Identity formation. Identity formation is an important element of the human development process. People have a universal need to establish and reaffirm their own self-image. Therefore, they perceive activities that allow them to form and reinforce their individual identities as useful for identity formation (Eccles et al., 1983; Fivush, 1998; Hannover, 1998). Creative activities and activities in which people are able to express themselves provide opportunities to form and affirm one's identity.

Life goals. Learners' developmental needs and life-goals are an important source of interest. People have needs and desires associated with improving how they function in the world (Eccles, Barber, Updegraff, & O'Brien, 1998; Hannover, 1998). For example, during adolescence and beyond, people are motivated to learn about social behavior because of their goal of developing satisfying intimate relationships. Similarly, they become motivated to learn vocational or professional skills that will increase their earning potential. Life goals create a usefulness for knowledge and skills that learners perceive as preparing them to function more effectively or comfortably

Curiosity. Curiosity arises when learners are confronted by unexpected gaps in their understanding or ability. Curiosity occurs in situations in which the learner's expectations are violated by their observations or experience (Schank, 1982). When an expectation-violation is optimally discrepant (Berlyne, 1966), it creates the motivation to learn that we call *curiosity*. Curiosity is the motivation to acquire the knowledge that will explain the discrepant event and allow the learner to resolve the gap in his or her understanding.

For the sake of brevity, we will use the term *interest* in the remainder of this paper to refer to the motivation to engage in an activity based on one of these sources of usefulness. This *interest based in usefulness* overlaps with the concepts of *individual* or *personal interest* and *situational interest* as they have been described in the motivation literature, but it has meaningful differences from both. We elaborate on the relationship between our concept of interest based in usefulness and these other conceptions of interest elsewhere (Edelson & Joseph, 2003).

Design of Interest-Driven Learning

We turn now to design. In order to achieve the benefits of interest based in usefulness, we present strategies for designing learning activities that draw on this form of interest motivation and address the challenges of coverage and strength.

The most radical view of interest-driven learning would organize learning environments that are entirely responsive to individual learner interest, for example, as in free schools, where students define the curriculum as they so choose (Mercogliano, 1998; Neill & Lamb, 1996). This strategy faces serious obstacles as a practical approach to education. First, it requires rare levels of internal motivation on the part of children. Second, it provides no mechanism for promoting learning objectives even marginally outside of learners' interests. Finally, it requires impractical levels of resources and flexibility in serving the divergent interests of individuals. Rather than reject the possibility of interest-driven learning because of these challenges, we have chosen to address them directly in the Interest-Driven Learning Design Framework through an approach that is less student-directed.

The Challenge of Coverage

The goal of the IDL design framework is to foster the design of learning environments that draw on interest based in usefulness as the central source of motivation. To do so, the design must address the challenge of coverage. Modern educational systems expect students to achieve a large number of learning objectives, many of which fall outside the ordinary interests of children. The challenge of coverage is the challenge of

broadening the scope of learner interests to include content and skills that students and teachers might not recognize as being interest-related. We call the process of connecting learning objectives to interests, *establishing relevance*. In the IDL Framework, relevance describes a specific type of connection between a learning objective and an interest: a learning objective becomes relevant to a learner when he or she recognizes that mastering the objective is useful to the pursuit of an interest. Dewey (1913) described this kind of indirect interest:

> Things indifferent or even repulsive in themselves often become of interest because of assuming relationships and connections of which we were previously unaware. Many a student, of so-called practical make-up, has found mathematical theory, once repellent, lit up by great attractiveness after studying some form of engineering in which this theory was a necessary tool. (p. 22)

Establishing Relevance: Connecting Learning Objectives to Learner Interests

A designer establishes relevance for a learning objective by designing an activity that is motivated by interest and that makes the mastery of that objective instrumental to success in the activity. Consider a student who is not interested in writing but who has a deep interest in music. A set of activities in which the student writes song lyrics would make writing relevant to that student's interest in music. The songwriting activities would be motivated by the learner's interest in music, and they would create a setting in which the student recognizes writing as a useful skill for the interest. Establishing relevance creates a direct connection between the interest and the learning objectives. It extends the interest to cover the learning objectives, bringing a mastery orientation and the other benefits of interest to those objectives.

A number of recent research efforts in the design of active learning have incorporated strategies for establishing relevance as central elements of their design approaches (without explicitly pointing to relevance as a concept). These approaches include Goal-based Scenarios (Schank et al., 1993/1994), Anchored Instruction (Cognition and Technology Group at Vanderbilt, 1992), Concept Oriented Reading Instruction (Guthrie & Alao, 1997) and Project-based Science (Blumenfeld et al., 1991). For example, project-based science establishes relevance by designing science investigations around driving questions that have "meaning and value" to learners (Blumenfeld et al., 1991). In one project-based science unit developed by the University of Michigan and Detroit Public Schools, *What is the Air Like in Our Community* (Singer, 2000), learners investigate the air quality in their own community. This unit is designed to capitalize on learners' concern for the welfare of their own community. In it, students conduct an investigation of the air quality in their community. This work requires them to develop inquiry and data analysis skills and to learn about the chemistry of air and its impact on the health of people and other living things. The design of the unit makes these skills and knowledge useful to the students in the area of their concern. In other words, the activity is designed to establish relevance for the students.

Like project-based science, all of the innovative approaches to designing learning activities mentioned above incorporate strategies for establishing relevance -- making learning objectives instrumental to learners' interests. In Goal-Based Scenarios (GBS), relevance is established by providing a learner with a role in a simulation that draws on an interest of the learner. Anchored Instruction creates relevance by establishing concern for the problems of a character in a fictitious story and, drawing on learners' identification with that character, engages them in solving the character's problems. Concept Oriented Reading Instruction (CORI) creates relevance for reading skills by incorporating interesting themes as topics for open-ended research. In IDL terms, these approaches illustrate how a designer establishes relevance in order to use an activity or topic that is already motivated by interest to generate a demand for target learning objectives.

In general, there are two strategies for establishing relevance. In some cases, the designer may design an activity around an interest that he or she selects in advance based on knowledge of the learners' interests. In others, the designer can design an activity in such a way that the learners are each able to bring their own interest to the activity. For both approaches there are two conditions that must be met to establish relevance: (1) achieving the learning objectives must be useful for pursuing the interest , and (2) this usefulness must be apparent to the learner. It is not necessary for the learner to recognize the learning objectives explicitly. However, it is essential that the activity be motivated by interest and that the need to develop additional skills or knowledge be natural and coherent within that activity. When these conditions are met, interest and its benefits for learning extend to the learning objectives that are nested within the activity.

In order construct designs that establish relevance, designers must be able to identify or anticipate learners' interests. To identify the interests of specific learners, a designer might observe, interview, or survey them directly or turn to an informant, such as a parent or teacher. In addition to identifying existing learner interests, this investigation process might identify opportunities to awaken new interests. For instance, someone with a strong interest in their own cultural identity might become intrigued by similar cultures.

In most cases, however, it is not practical to identify the specific interests of learners. Instead, it may be necessary to anticipate them. In anticipating interests, designers would benefit from research on the specific interests of school-age children and adolescents. However, lacking this research, designers can work from the five sources of usefulness that we identified above: pleasure, concern, identify formation, life goals, and curiosity. Drawing on any knowledge or expectations of the developmental stages, cultures, goals, and knowledge that learners will bring to the activities, designers can infer likely interests. Of course, any effort to anticipate interests raises concerns about both individual differences and reinforcement of stereotypes. Clearly, the deepest and most abiding interests differ dramatically from individual to individual. However, the strength of motivation associated with these "deep" interests may not be necessary to serve as useful motivators for learning. We have observed that many interests (e.g., community concern) are shared across large groups of students at a strength that is sufficient to motivate learning. This is particularly true in age-grouped and community-based settings like current schools, where interests associated with developmental stages and the local area are widely shared. In addition, it may be possible to restructure schools in order to group students by interest, rather than by ability or the other considerations that are currently used.

In addition to the general sources of interest, the process of identifying interests should also be guided by the particular set of learning objectives that the designer is targeting. Any particular set of content or skills will suggest broad areas of interest that the designer can consider. At the same time, learning objectives create constraints on learning environment design in that they may demand particular kinds of activities that are difficult to make relevant to particular interests – for example, certain kinds of mathematical learning objectives might not arise naturally in a dinosaur curriculum.

The process of establishing relevance is an iterative process of generating and evaluating potential themes of interest and matching them to learning objectives. It is a constraint-satisfaction process, in which the designer must identify a compelling interest that motivates learning activities that require mastery of the learning objectives and provide opportunities to master them. We describe a set of learning objectives, interests, and learning activities that satisfy these constraints as being *aligned*. In practice, sometimes it is easier to generate candidate interests from learning objectives and then develop the learning activities. Other times it is easier to move from objectives to activities and let the activities suggest the interests. In practice, designers move back and forth between constraints until they reach a design that appears to be fully aligned.

By making relevance the goal of design, the IDL Framework transforms the challenge of coverage into the challenge of alignment. Achieving alignment can be a difficult design problem. We have identified three potential pitfalls in the design of relevance. They are misalignment, missed relevance, and unfulfilled interest. *Misalignment* occurs when the learner's interest, the activities, and the learning objectives do not connect effectively. *Missed relevance* occurs in two situations: when the connection between the activities and students' interests is invisible from the beginning, or when students lose sight of the connection over the course of the activities. *Unfulfilled interest* happens when the designer succeeds in motivating the learner to engage in the activities based on the perceived connection to interest, but then fails to satisfy the interest in some significant way.

The Challenge of Strength

Strength problems occur when a learner's interest is not strong enough to drive deep engagement in activities, at least not with sufficient effort or attention to achieve the intended learning objectives. Strength problems can take three different forms: problems of perception, fluctuation, or unpleasantness. In a *perception* problem, the relevance of a set of activities to an interest may not be apparent until a learner has partially completed them. For example, a physics curriculum designed to capitalize on learners' interests in architecture and construction might require that learners develop a significant amount of physics knowledge up front. However, the value of the physics learning to the interest-driven architecture activities may not be apparent to the

learners until they have learned a good deal of physics. Here, because of the perception problem, relevance and interest may not be strong enough to motivate the activities necessary to learn the physics. *Fluctuation* problems are the result of the natural variation in learners' levels of interest over time. For example, young students working on a project that will culminate in a public performance several months in the future may lose some of their interest after a few weeks, only to regain it later. The problem of *unpleasantness* occurs in tasks that, even when motivated by interest, may have some aversive aspect that interferes with the interest. Certain activities may be difficult, may require repetition, or may require a student to participate in an undesired social grouping.

In response to these challenges to the strength of interest, the IDL Design Framework calls for interest to be supported by other sources of motivation. Because designers elicit these other forms of motivation through their decisions about how interest-driven tasks will be implemented, they play the role of *context motivators* in the IDL Design Framework. For example, consider a language arts learning activity that is implemented as a sports journalism project. In this design, the sports topic and the journalism task would be core features of the activity designed to capture interest. The audience for the writing, the number of choices that a learner gets to make, and whether work is done individually or collaboratively are all attributes of how the activity is implemented and are potential sources of context motivation.

The IDL framework incorporates a taxonomy of nine context motivators in four categories (Table 1). These are drawn from the existing research literature and organized based on how they can be used in the design of interest-driven learning activities. The categories of context motivation are *effectiveness, progress, social context*, and *extrinsic*. We describe these motivational constructs and their role in the design of interest-driven learning in greater detail later elsewhere (Edelson & Joseph, 2003)

Table 1. The context motivators in the Interest-Driven Learning Design Framework.

Context Motivator	**Elicitation Context**
Effectiveness	*Activities that enhance a learner's sense of personal effectiveness.*
Challenge	When the level of difficulty challenges the learner's sense of competence without frustrating the learner
Control	When the level of structure and choice matches the learner's desire for autonomy.
Progress	*Progress through a sequence of activities.*
Completion	When the learner motivated by approaching the completion of a task.
Investment	When the learner is motivated by the awareness of time or effort already expended on a task.
Social	*Social situation in which an activity takes place.*
Role	When the learner is motivated by the opportunity to play desirable social role in an activity.
Affiliation	When the learner is motivated by the chance to be a member of a desirable social group.
Obligation	When the learner is motivated by a sense of obligation to others.
Extrinsic	*Opportunity to derive a benefit that is not integral to the task or activity.*
Reward	When the learner is motivated by the promise of a token with value.
Advancement	When the learner is motivated by the chance to move ahead through an educational or social system.

Supporting Interest with Context Motivation

The IDL framework addresses the strength problem by supplementing interest motivation with context motivators. Context motivators can support interest in two ways: through *initiation* and through *maintenance* of motivation. Context motivators can be used to *initiate* learners' engagement in an activity that is not readily recognized as relevant to interest. For example, when a teacher is concerned that the relevance of a set of

activities may take some time to become clear, she may arrange the classroom structures to provide additional social motivation that will help to engage students until the relevance is established. When they are used in this way, context motivators are functioning in ways that are similar to the catch facets of situational interest that Mitchell (1993) identified.

Maintenance addresses the problems of interest fluctuation and necessary but aversive activities. Context motivation can be used to support interest in these moments. For example, in an extended activity, interest might be expected to drop at some point. A designer might use deadlines to tap into a learner's sense of investment and anticipation of completion, providing enough of supplementary progress motivation to maintain the learner's engagement.

As we mentioned previously, designers must attend to the issues of balance and alignment when using context motivators to initiate or maintain interest. For example, if the motivation to act that results from context motivation is not properly aligned with the goal of the learning activities, then the context motivation may cause a shift in focus away from the learning objectives. This is what happens when students develop a performance orientation.

Conclusion

In the IDL Design Framework, designers select core activities and tasks that are designed to capture interest based in usefulness. They then design the activities in ways that are designed to elicit other forms of motivation in order to supplement interest where necessary. This process is implemented in four phases as shown in Table 2.

Table 2. The Interest-Driven Learning Design Process

Phase	Process
Determine learner interest	Expose or infer existing interests and opportunities to elicit new interest.
Align learning objectives and learner interest	Identify learning objectives directly motivated by interests and opportunities to create relevance to interests for others.
When necessary, use context to initiate motivation	Where relevance is not likely to be apparent to learners, use context-based motivators to help initiate motivation.
When necessary, use context to maintain motivation	When interest is likely to flag over time and effort, use context motivators to help maintain motivation.

While the Interest-Driven Learning Framework is grounded in research on learning and motivation, no empirical research has yet been conducted to evaluate its effectiveness as a support for designers or on the outcomes of implementing IDL curricula. Therefore, we are pursuing a research program to investigate the hypotheses that are implicit in the framework through design and empirical research. For example, in one current project, we are investigating the extent to which students "buy in" to the role and goal of a project-based science unit, the factors that influence that buy-in, and the implications of buy-in for engagement and learning (Pitts & Edelson, 2004). Concurrently, we are working to develop analytical instruments to support framework-based analysis of existing designs, with the ultimate goal of proposing an evaluative rubric to guide design and evaluation of designs (Joseph & Edelson, 2004).

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