Chapter 2

CONCEPTS

Content: Design Process, Learning, and Child Development

The central goal of *Designed Environments: Places, Practices, and Plans* is for children to apply technology design processes to situations in their daily lives. This chapter contains content background for *Designed Environments* activities and relates children's learning and development to those activities. Understanding technology design processes is central to the activities, and so a major portion of this chapter is devoted to a detailed description of them.

Where's the Technology?

How does technology relate to designing environments? As presented in *Stuff That Works!*, the purpose of technology is to solve practical problems by means of devices, systems, procedures, and environments that improve people's lives in one way or another.

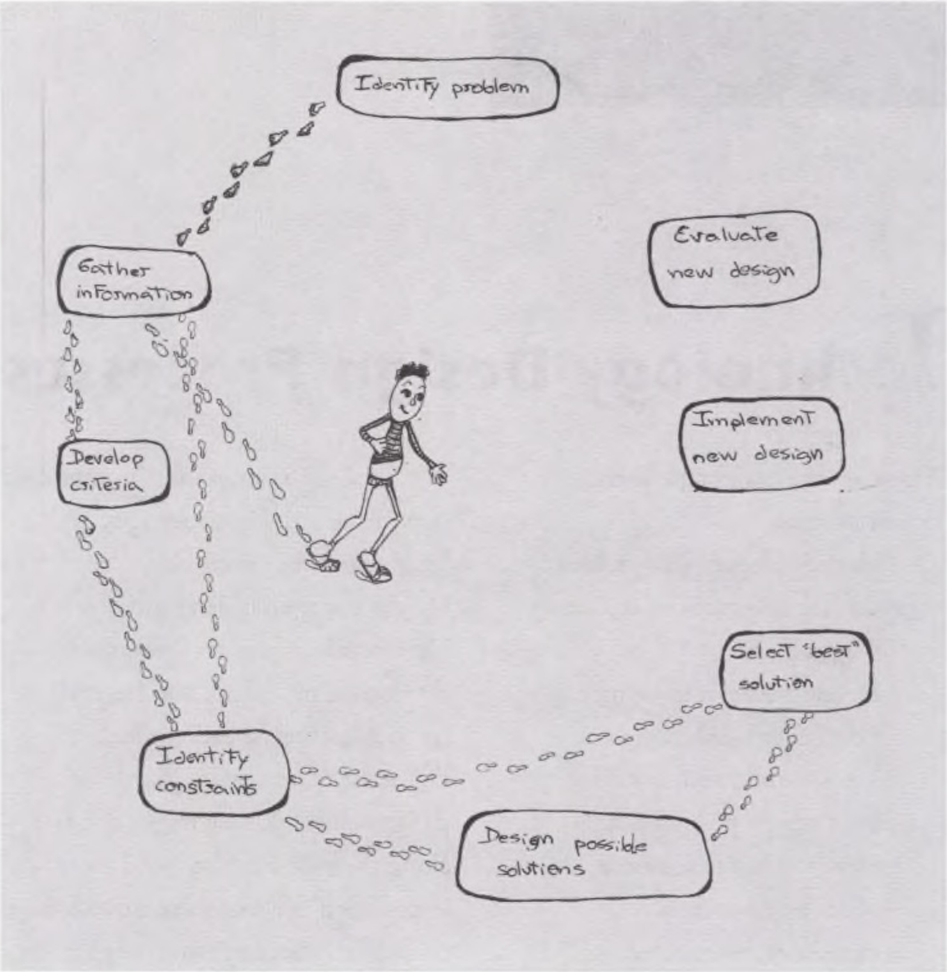
Technology Design Processes

These are the basic steps in the design process:

- Identify an everyday problem.
- Gather information: analyze the problem.
- Develop criteria to be met by a design solution.
- Identify the constraints that limit design possibilities.
- Design possible solutions.
- Select a best solution.
- mplement the selected design solution.
- Evaluate the new design.
- Develop a new design solution, if indicated by the evaluation.

What follows is an examination of each step in the order in which they are listed above, but don't be misled. Design is not an orderly process. It is like writing: as you go forward in developing new ideas, you have to go back and revise earlier ideas. For example, as children work on design solutions, they might discover along the way that they need more information and that there are additional constraints affecting what they can do.

2-1: **Design is not an orderly process.**



The need to go back can also occur at what the designer thinks is the end of the process, when the design is being evaluated. Even bad designs usually meet all the initial design criteria, but a design solution will fail at the evaluation stage if relevant criteria were omitted at the beginning. Before redesign begins, the design criteria need to be changed.

These experiences are common to the experience of all designers, not just children. This non-linear messiness is part of the process and is reflected in the approach to environmental design presented in *Designed Environments: Places, Practices, and Plans.*

Planning for the Unexpected

Designed Environments activities are not static pieces of curriculum that fit neatly into a particular time slot in the school year. Rather, they are triggered when children identify a problem or need in the classroom or school environment that can be solved by changing the way the environment is designed. Thus, as you do your curriculum planning, try to build in some flexibility. This will let you take advantage of the opportunity for an environmental design project when it arises rather than slotting your *Designed Environments* work into an arbitrary period, such as the tenth week of the school year.

Identify a Problem or Need

In the normal course of living, children, like all people, experience challenges and difficulties. They encounter situations where changes in the physical space or the way it is used—which includes such things as schedules and rules—would make life easier, more fun, and more interesting for themselves and others. But children often don't recognize the problems, and even if they do, it probably doesn't occur to them that they could have a role in coming up with solutions. A major goal of *Designed Environments: Places, Practices, and Plans* is to sensitize kids to design problems in their environments, and then to help them see themselves as capable of using design to change things for the better.

The best way to introduce a *Designed Environments* project is to use a problem that children are already aware of. Chapter 1 described how Fiona guided her children from their upset into a *Designed Environments* project. The children's complaints had identified a problem: wasting time waiting for the school lunch. Although it was their problem, the children had not begun to see it as one they could solve. Fiona legitimized the problem by discussing it with them. As she elicited different observations from the children, a more complete understanding of the problem emerged. This process helped the children see the problem as one they might address.

Fiona's children had already verbalized the problem. But what do you do when children are bothered by something but don't express it directly? This is where a scavenger hunt and brainstorming come in. In this case, the object of the scavenger hunt is to find problems in environments—"environments" being physical spaces and how they are used as determined by habit or by rules, regulations, and schedules. Brainstorming is a tool for generating ideas about a problem itself—what additional information is known or needed and preliminary notions about possible solutions.

2-2: **What's the problem here?**

Getting the Most from Brainstorming

Brainstorming is a technique for getting a lot of ideas on the table fast. It can help children see and think broadly about a particular topic. The technique is simple. Present a question or problem to the class and record all contributions. This is not a time to judge the quality of a contribution, but rather to elicit as many ideas as possible. Ideas that appear silly are recorded alongside those that seem better. Brainstorming is productive because each student begins to form a larger concept of the topic, and get new ideas about it, by hearing the ideas of others. Categorizing the items on the brainstorm list is a common way to follow-up the brainstorming. Brainstorming is also a good awareness-raising activity to precede a scavenger hunt.

Begin by conducting your own scavenger hunt and brainstorming for *Designed Environments* problems in your school—minor inconveniences, snafus, poor practices, and so forth. Think about categorizing what you come up with. Categories for school problems could be based on the level in the educational system at which problems originate or the physical places in which they occur.

Disorderly transitions is an example of a problem that begins at the classroom level. Examples of problems that are created at the school level might include the way the school day is structured or how children are assigned to classes. Problems created at the school district level typically stem from policies. New curriculum and testing demands mandated at the state level create a different set of problems.

A whole new set of issues emerges when you brainstorm problems according to the places they occur—on the playground, in the bathroom, or in the hall. What about particular areas of the classroom such as coat closets, storage areas for student work, the teacher's desk? There are other types of categories, each one of which provides a different lens for brainstorming about school problems—the people involved, for example (principal, teachers, aides, children, custodians, parents), or troublesome behaviors. List all of the problems you find. This is a consciousness-raising process to prepare you for helping your students become aware of *Designed Environments* problems.

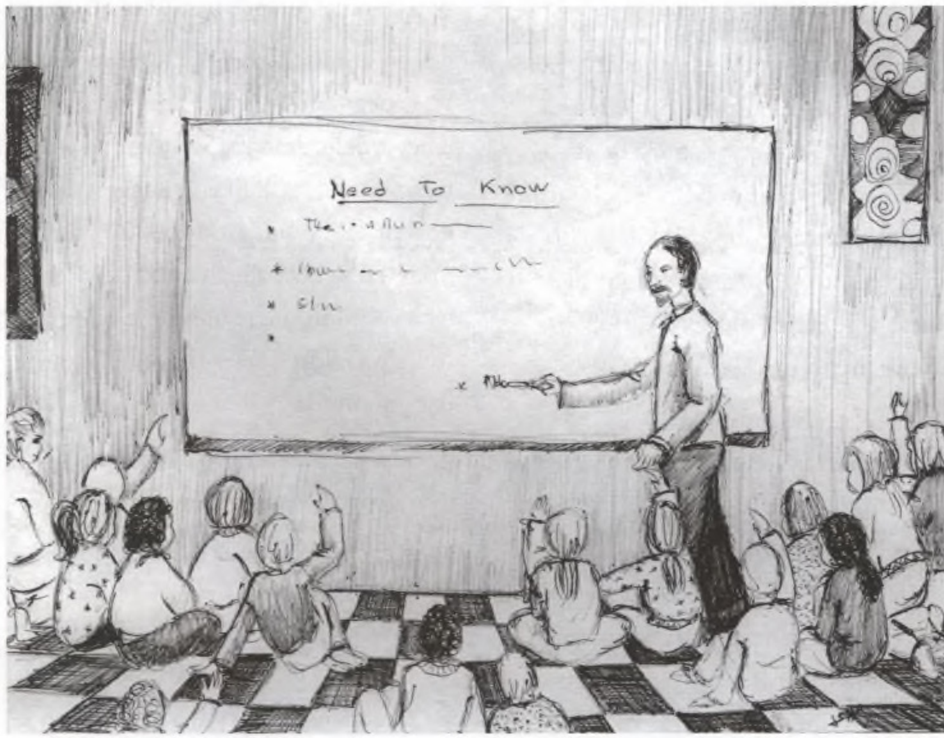
Next, go through the same process from the point of view of your students. What kinds of problems, annoyances, and disruptions do they contend with at school? When you identify a condition that impacts a lot of students and that is amenable to improvement, bring it up for class discussion. Encourage children to talk about the situation and about their experience with it. Such a discussion lets children know you are interested in the things that make their life at school more difficult and also in their ideas about how to make things better.

Gather Information and Analyze the Problem

Chapter 1 describes how Fiona's class began brainstorming about time wasted in the cafeteria. She led the brainstorming into a discussion of the additional information they needed to understand the problem better. Without this kind of guidance, a discussion about a problem may jump prematurely into possible solutions before the full nature of the problem is known. The teacher's job is to help children think about the kind of information they will need, and how they might go about getting it, before beginning to design solutions.

A good brainstorming session leads to more information-gathering. One purpose of brainstorming is to identify areas where more information is needed. These should be sufficiently clear so that groups of students can sign up for areas at the end of the brainstorming session.

2-3: **Brainstorming can get a lot of ideas on the table fast.**



These questions will help focus the brainstorming and identify areas where additional information about a problem is needed:

- Why is it a problem? What is it about the situation that we don't like?
- What information can we collect to see how severe or widespread the problem is?

Qualitative information:

- Does it happen at a particular time?
- Who is involved?
- Does it happen every day or just some days?
- Does it always happen in a particular place?
- Are the same people or groups always involved? If so, which ones?

Quantitative information or data

- How long does it last?
- How many incidents are there?
- How many people are affected?

Divide students into small groups and assign one question to each group. The groups should figure out how to get their information and then gather it. As groups share what they find out, allow time for the class to analyze this new information. The purpose of sharing isn't to make a report, although this is an important experience (and addresses an English Language Arts standard). Rather, the purpose is to achieve deeper understanding by using critical listening and thinking skills to analyze each report. Questions like these will help children develop and apply these critical skills:

- Does the information in the report agree with what you know of the situation?
- Does the information (data) in one part of the report agree with information in another part? In other words, do the numbers and number patterns make sense?

Next, have children compare reports, using questions like these:

- Does the information in Group A's report seem to match the information from Group C?
- How are these facts (give examples of facts reported by two different groups) related? Do they support each other or contradict each other?

(In the cafeteria schedule problem described in Chapter 1, one group reported the official lunch schedule and another group reported class arrival times at the cafeteria that were different from those scheduled.)

Analysis of the information gathered at this stage leads directly to the next steps in the design process.

Develop Criteria to Be Met by a Design Solution

When children first begin to develop design criteria, their thinking tends to be generalized as well as personalized. They might describe what an improvement would look like or suggest a goal or end result, and they are likely to describe how they would be affected by a solution. Here are some questions to help children start thinking about design criteria:

- What should the environment (space, way of doing things) look like once we have solved the problem?
- What should a new design allow or help us to do that the current one doesn't?
- What are the good points about our current way of doing things? How can we maintain them in a new design?

Now you need to help them move beyond these initial ideas. Your task is to help them see the solution in terms of its parts—a systems approach—and to broaden their perspective beyond their own point of view. Everyone who has contact with the space or practice or plan where the problem exists will be affected by the design solution. Questions like these will help children take that fact into account as they go about working on the problem:

- Think about my job as the teacher. What do you think I would like the new design to do?
- What do you think is important to the principal regarding this problem? Is it the same as what is important to you and me? Why or why not?
- What would a kid in kindergarten (or the third grade, and so on) think about this problem?

An environment is a complex system with many interrelated parts that function together. The classroom environment includes students, the teacher, visitors, people who use the room outside of class hours, objects such as supplies and materials, rules and regulations that affect what happens in the room, and so on. A change in the way the classroom is arranged might result in the need to change a classroom rule.

Like the classroom, the school is a complex environment. Thus, changes planned by children may affect other classes as well. When they do, the system of interrelated parts affected by the new design may stretch to the whole school. These questions will help children think in terms of the school as a system:

- Who else could be affected by our design solution?
- Could the new design affect anyone in another (specify) class? How?

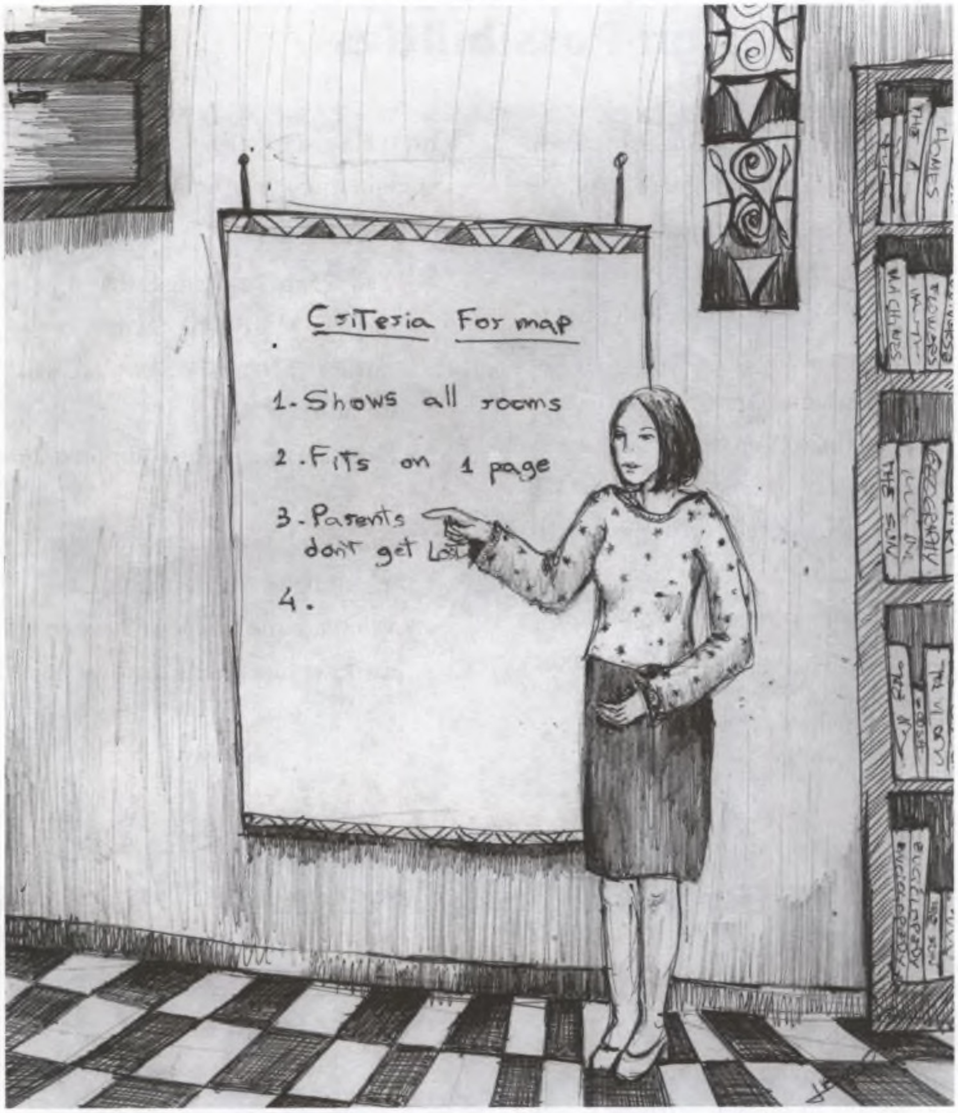
The cafeteria schedule planned by Fiona's class would affect other teachers, other classes, and cafeteria workers. Their points of view should have been considered in planning the new design. When children figure out all the people affected by a change, they are developing the notion of a system. When children consider the desires of these other people as they develop design criteria, they are developing the values and attitudes of good citizenship.

Design criteria are the conditions that a design solution must meet in order to solve the problem that has been identified. They are used at two key points in the design process—when the design is being formulated and when it is being evaluated.

At the design stage, children use the criteria as a framework on which to build their design solution. They project what a design would be like when implemented, and test that projection against the criteria, using everything they know about people, materials, and whatever else is involved in the design.

At the evaluation stage, the criteria are used to measure the success of the design by comparing the solution with the criteria to see if they have been met. If the design doesn't meet all the criteria, the designer has more work to do. Evaluation also measures the adequacy of the original design criteria.

2-4: **How will we know if our design solves the problem?**



Because environments are such complex systems, designers often find that a design doesn't work because it has unintended consequences, even though it meets all the criteria initially set. In such a case, additional criteria are needed, as well as a redesign.

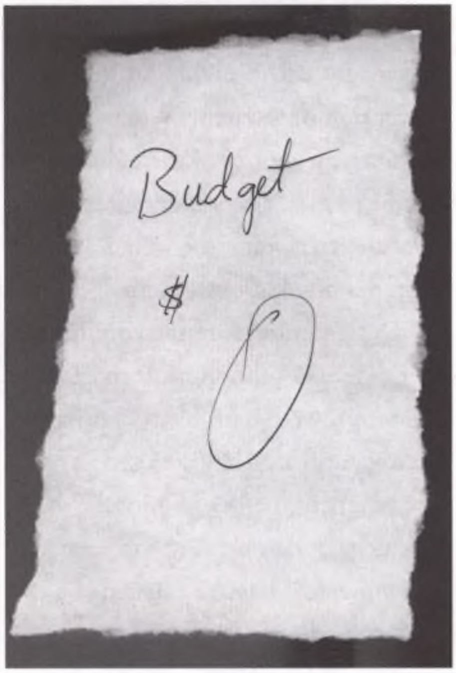
Identify Constraints That Limit Design Possibilities

All design is done within constraints. Constraints include limited resources such as time, money, space, and materials. Lack of authority to carry out the design or the need to obtain permission is another kind of constraint.

Constraints come to light in several ways as a natural part of the design process, as designers gather and analyze information, develop criteria, and share their ideas and criteria with others who have a stake in the design solution. This happened in Fiona's class as they shared designs with each other and with the assistant principal. Here are some questions that help identify design constraints:

- Can we make changes that require money? More equipment? New furniture? Where will we get what we need?
- Does anyone need to approve the changes we want?
- What stands in the way of changing things in this environment?
- What are the limits we have to work within? What can't we do?

2-5: **What limits what we can do?**



Design Possible Solutions and Choose the Best One

Fiona's class worked through four stages of the design process:

1. The class brainstormed possible designs to shorten cafeteria waiting time, then individual children developed their own proposals.
2. Individual proposals were shared within groups, becoming the basis for a single proposal from each group.
3. Group proposals were shared with the class and the assistant principal.
4. After feedback on the group proposals, the class developed a final design, in this case a new lunch schedule.

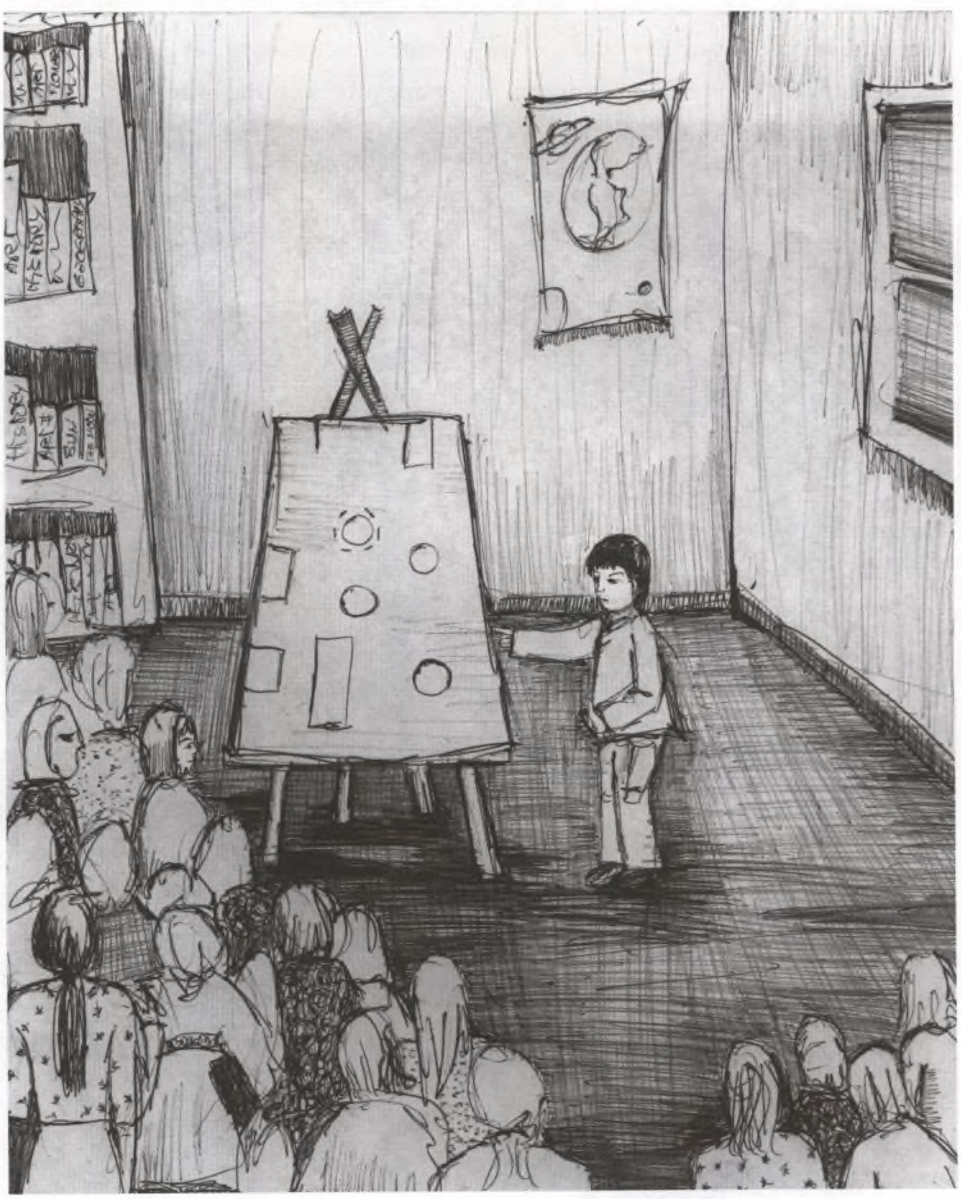
As children see that they can solve real problems and thereby improve the class and school for themselves and others, their school lives are affected in positive ways. The outcome in the form of an implemented solution is important, but precisely because this is such powerful work, the process leading to the solution is even more important. Each child needs to see his or her contribution to the solution. Thus the process leading to a "best" solution should be collaborative, so that everyone feels a sense of ownership, rather than competitive, which gives one group credit for the "best" design and the rest are left with a sense of failure.

Use these ideas to guide discussions that lead up to selecting the design solution that will be implemented:

- There is no one best design.
- A design may be most effective in meeting one or more criteria but might (and often does) fall short in addressing others.
- Any real-life design context is complex: there are many desirable outcomes, many constraints.
- Different criteria will compete with one another. Not all desirable outcomes can be achieved by one design.

- Children will not agree on which outcomes are most or least important.
- Each design developed by a child or by a group can reveal valuable ideas about the problem and about what makes a solution desirable. Each design represents a unique point of view and contributes to the overall process.
- Each proposed design (even the most off-the-wall one) can stimulate new design ideas.
- Each reaction to a proposed design contains implicit criteria, constraints, and ideas of how something will work. These are worth exploring further.
- Trade-offs begin to be made and understood as the class moves toward an acceptable common design.

2-6: **Sharing design ideas with the rest of the class**



When children present their designs, use the following to help them make their thinking as clear as possible for the benefit of all:

- Did anything present a problem for you as you thought about your design? How did you deal with it?
- What other designs did you consider? Why did you reject them?
- Describe how you imagine your design working.
- How does your design meet the criteria?
- Describe how your design stays within the constraints.

Take each design effort seriously, even when the child pretends not to do so. There is something in each child's work that can contribute to the thinking of others. In the act of presenting it, a child will often get new ideas or see problems in his or her design. Watch for and encourage this on-the-spot thinking. As you guide the class toward choosing a design that can be implemented, take every opportunity to acknowledge the collective thinking and collaboration that have helped to shape the design.

Plan How to Implement the Solution, Then Implement It

The ways to implement a design are as varied as environmental designs are. Designs that change the physical space of a classroom and designs that affect other parts of the school usually take more planning to implement than designs that affect only a few children or are limited to classroom procedures.

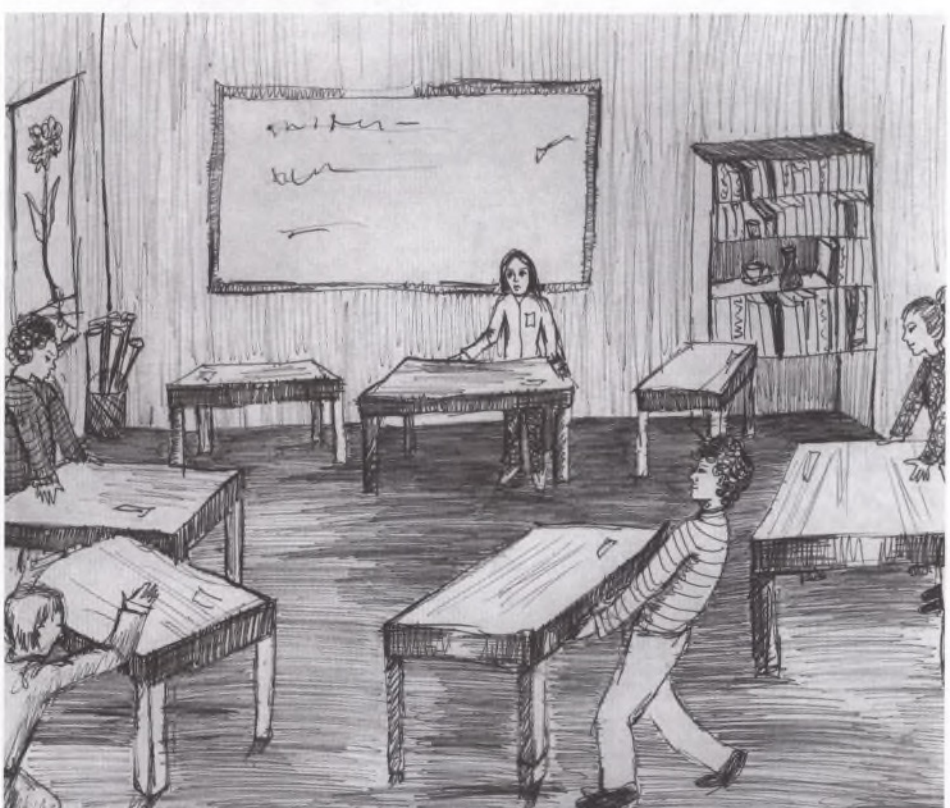
Encourage children to plan how they will implement a change, even when it is a simple one. When implementation is allowed just to happen, carried by the enthusiasm of the children, problems usually emerge—e.g., disagreements about who does what, what goes where, or what the design actually means. Planning how to implement a design avoids these problems or makes them easier to resolve. Fiona's children had to plan carefully because their schedule redesign affected the whole school. Their implementation plan included a "communications campaign" to persuade others of the merits of a new lunch schedule and to win their cooperation.

The implementation phase of a complex design project is itself a design project. Children need to analyze what needs to be done, the number of children needed to do each thing, and the sequence of actions, and then they need to determine who will do what. Some designs require significant planning to implement because the implementation itself takes place within constraints. In Chapter 4, you will read about Angel's children who could only rearrange the classroom furniture during their lunch hour.

Other projects require much less planning to implement, but are subject to revision as feedback during implementation reveals new criteria and constraints. An example of this is seen in Chapter 1, as Bret's class worked toward a solution to constant interruptions from the telephone in the classroom. Their initial plan underwent a series of modifications as new situations arose and had to be accommodated. Each new development served as an evaluation of the protocol they had developed, and thus led immediately to a redesign.

One final word on implementation: Involve as many children as possible in the implementation, not just the group whose idea it was. If evaluation can take place while the design is being implemented, you may want to involve some children in the evaluation effort while others do the implementation.

2-7: **Implementing a design solution**



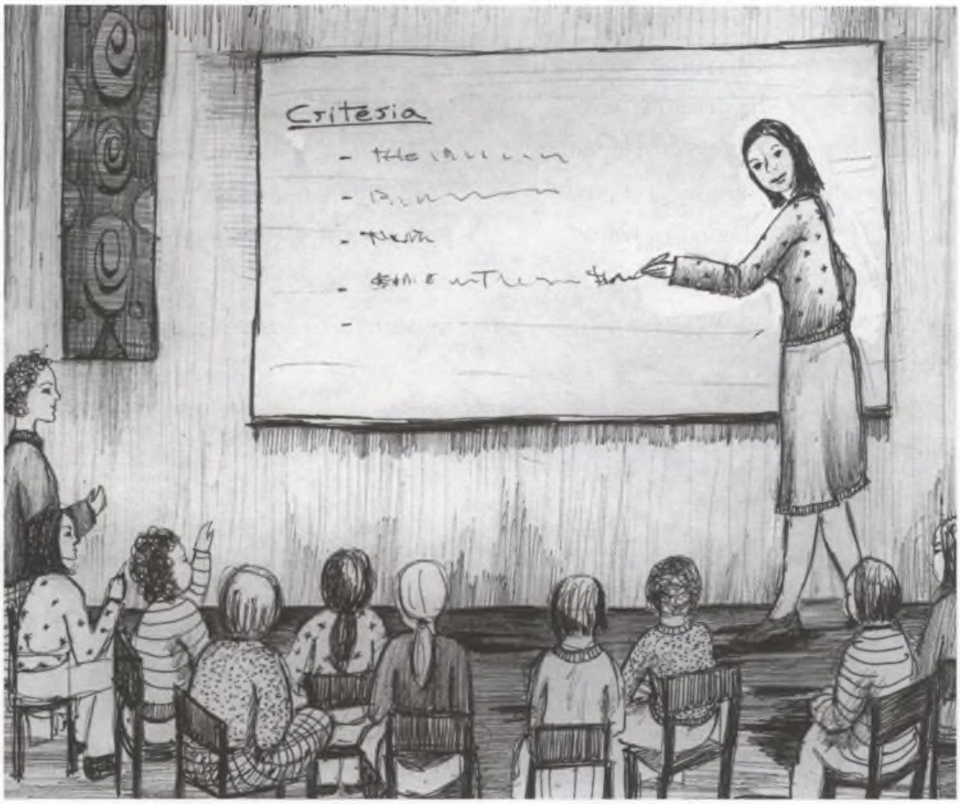
Evaluate the Solution After a Trial Period

In our experience, evaluation is the most difficult step in the design process. If a design works well once it is implemented, a formal evaluation plan may seem unnecessary. If the new design is not working, children and teacher may simply go back to the old way of doing things rather than investing more time in a project that seems to have failed to achieve its goal. In either case, valuable learning opportunities are lost.

Regardless of the apparent success or failure of the design solution, we encourage you to conduct a formal evaluation of the design. This is a unique time to develop children's intellectual skills and to model a good life-long habit. The groundwork for evaluation has already been laid. By this point, you will have seen children develop and practice analytic and problem-solving skills, social skills, and communication skills. These same skills are exercised in evaluation, but with more emphasis on analysis.

Start by eliciting students' general impressions about whether a design solution is working or not working. Whichever answer they give, follow-up immediately by asking, "Why?" List all the "whys" on the board. This list will lead in two directions: some of the "whys" will be related to the design criteria set earlier in the project; others will suggest criteria that were omitted.

2-8: **Elicit general impressions about whether the design worked or not.**



Reproduce the list of design criteria that your class developed earlier. Ask the children to analyze the list of reasons the design works or doesn't work and decide which reasons are related to the criteria. The next step is for them to develop a way to demonstrate how each criterion is or is not met. This is usually an issue of measurement: What can you count that will show that a criterion is or is not met, and how will you count it? The criterion Fiona's children had set for the redesign of the lunch schedule was that nobody would have to wait more than five minutes to be served lunch. Here the measurement is simple. The only decision to make is when to begin timing the wait and when to end.

Some criteria are qualitative rather than quantitative—e.g., "I like it better," "It's more comfortable," and so forth. Systematically gathering opinions from all the people affected is one way of dealing with qualitative data.

The reasons designs don't work are often linked to important criteria that were not included in the design criteria established at the beginning of the process. Review the list of reasons why designs work or don't work and identify those that are not related to the original design criteria. Ask the children to develop, from this list, additional criteria that should be included in the design criteria. When these have been developed, discuss what techniques you might use to measure whether or not a particular criterion was met. This is where redesign begins.

Redesign

The idea of going back to redesign the solution should carry a positive message: Rather than settling for a solution that doesn't achieve your goals, you can always make it better. Even if constraints on time or other resources prevent the class from carrying out a redesign at present, it's important to get this positive notion across. The children will already have ideas about how they would improve a design. This is something for them to value, even if they can't do the redesign right now. The ideal scenario, of course, is for children to use everything they have already learned in the project to do it even better the next time.

What Children Need to Know for *Designed Environments* Projects

Children need to know very little traditional subject-matter content in order to carry out *Designed Environments* activities. This is not to say there is no content, however. Rather than being conceptual or fact-based, the content of *Designed Environments* is based on using critical thinking skills, analysis, and perceptual awareness, and on putting everyday experience and practical knowledge to work in order to solve problems. More than anything else, when children are engaged in *Designed Environments* projects, they are learning by doing.

When children—even 5- and 6-year-olds—think about how to redesign a room, they bring to the problem a wealth of experience that comes from living and working in rooms their entire lives (however short!). The wider the experience, the more varied the possible solutions they can consider. Some children will come with ideas about how to do specific things. They will have experience in making plans and arranging things, though they may not know to call it that. Your job is to provide opportunities for them to heighten their awareness of and ability to use what they already know and to expand this everyday knowledge.

Children Learning from Children

Children can help each other become more aware of what is around them and able to describe what they think. The most observant and verbal children will often bring lots of ideas to a group discussion. Encourage and honor all children's ideas as a way to broaden everyone's background knowledge and to give all children confidence to share what they think. This doesn't mean you should accept inaccurate information, however. But rather than labeling an answer as wrong, you can use guided discussion and questioning to help children evaluate their own ideas and revise them when necessary. This can happen during the course of a discussion by encouraging further reflection and analysis within the group, or it can happen when a child takes on a question as a research project.

Directed Observation

By directed observation we mean focusing children's attention on a specific aspect of the environment. This is typically done by asking children to:

- Describe/record the details of a place or object, often through drawing.
- Compare a new place, object, or arrangement with one that is already familiar.
- Look for cause-and-effect relationships.
- Analyze the way the parts of a complex object (or environment) interact with each other.
- Count or measure things within the environment.
- Look for order within the environment—a sequential order of events or a predictable change in some aspect of the physical environment, such as light, temperature, or noise.

Expanded Opportunities for Observations

Field trips, used in conjunction with focusing activities like those above, are among the best ways to broaden children's background knowledge of the environment. Field trips can be within the school as well as outside. When the project involves redesigning something in the classroom, field trips to other parts of the school are invaluable. Take the class on trips to other classrooms to see how desks and other furniture are arranged, how supplies and other materials are stored, what centers there are and how they are set up, and any other aspect of classroom design. On any field trip, draw the children's attention to how people arrange things, where the signs are located, where traffic bottlenecks occur and why. Through such experiences, you expand the reservoir of everyday knowledge children draw upon in designing solutions to new problems. This is the knowledge that underpins *Designed Environments* activities.

Lots of Talk

Talking about what was observed on a field trip is as important as the trip itself. It is critical that children have opportunities to discuss similarities and differences, to compare one experience to another, to specify the details of a situation with clarity and accuracy, and to share other such analyses. Through these conversations children help themselves and each other form a coherent understanding of a new situation and connect this to their understandings of other similar situations. Hearing others talk about how things are done in the everyday world, they form connections with current factual knowledge, conceptual understanding, previous experience, and partially remembered ideas and images. Through this process they revise and build on what they already know as they acquire new knowledge and insights.

What a Teacher Knows

There is another sort of content that teachers bring to activities in *Designed Environments: Places, Practices, and Plans.* This is related to specialized knowledge that trained professionals use when they design environments—knowledge about lighting and visibility, how much space people need to feel comfortable, how to control variables such as noise, heat, and traffic. What a teacher knows is that some light levels make reading easier; some noises are distracting, and crowding often leads to behavior problems. You can help your children think about how these variables affect people's behavior and sense of well-being by asking them to think about the answers to questions like these:

- How much space do you need to be comfortable?
- How does what you can see change when light goes from dim to bright?
- What happens when you are trying to work and people nearby are making a lot of noise?

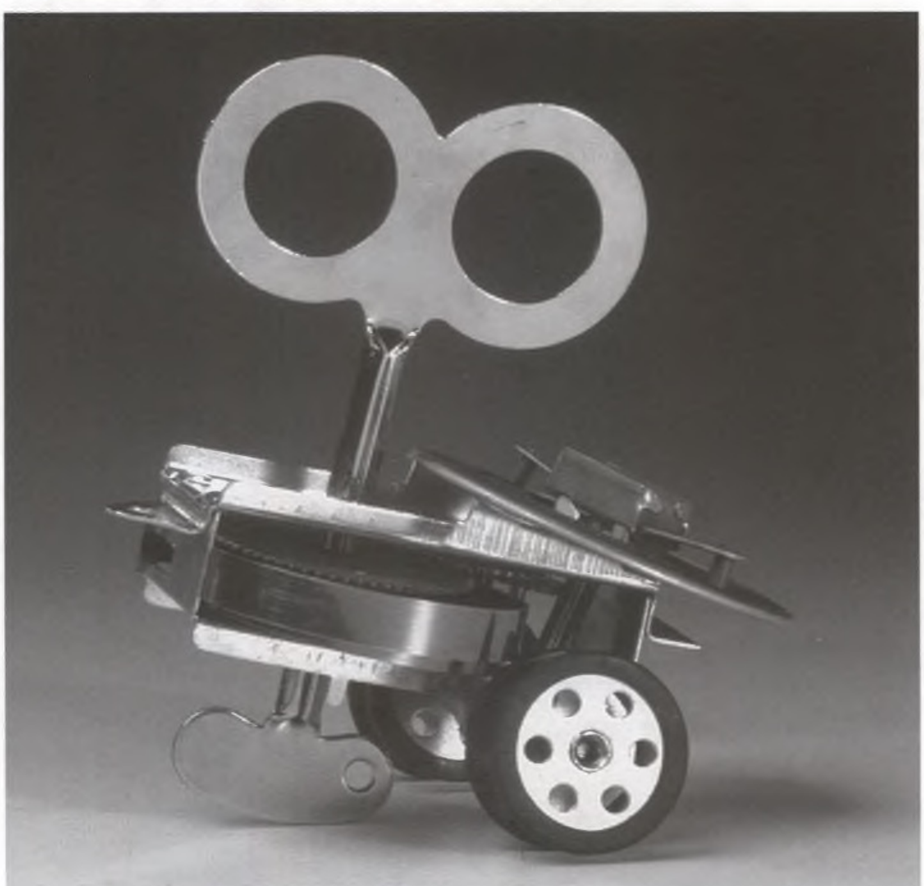
Systems Thinking and Environments

Systems is one of the common themes in the AAAS *Benchmarks*. It is also a unifying concept of the *National Science Education Standards*, and systems thinking is a goal of various other educational standards. These are the basic characteristics of a system:

- A system is a group of interrelated parts that together form a whole.
- The functions of a system are greater than the functions of its parts.

These statements define a system in terms of structure and function. A system is easily understood when applied to a mechanical device. For example, a wind-up toy car is a group of interrelated parts: wheels, axles, springs, gears, keys, toggles, and the like. Placed in the right relationship to one another, the parts form a toy that is able to do more than any of the parts can do separately, namely move itself.

2-10 **A wind-up toy is a system and contains sub-systems**



The wind-up car is a system in and of itself. It also contains subsystems—groups of parts which themselves form systems. The wind-up motor, apart from the wheels and chassis, is such a subsystem. The wind-up car itself can be a subsystem when placed in a larger system. This can be seen when a child places the car on a network of roads and buildings that she has constructed in the block corner.

Identifying the interrelated parts of a system is more complex when people are involved. A child needs help to see that he is a part in a classroom system, along with all the other people in the room. When he is sad, others are sad too. Even for adults it is difficult to identify everything that is important in a system. It is almost impossible for the beginner to specify ahead of time everything a design should be and do.

The experience of planning and evaluating environmental designs develops the ability to identify the parts and functions of a system. Conversely, the ability to identify the parts and functions of a system helps one to define that system. Environments are systems, so environmental analysis is systems analysis and should be guided by the same kinds of questions that guide systems analysis—for example:

- What are the components of the system?
- How do these components interact?
- How does a change in one component affect another?
- What are the properties of the system as a whole?
- How does the system as a whole function?

These are the same questions children are answering when they gather and analyze information about an environmental design problem, identify design criteria, design and implement a solution, and evaluate the effectiveness of the design.

Learning and Child Development in *Designed Environments* Activities

Roger Hart is an environmental psychologist whose specialty is children in their environments. He describes children as designers of their own spaces from a very early age. Initially this "designing" is finding spaces that feel comfortable, that fit. Children crawl beneath tables, especially with tablecloths hanging down. They burrow beneath sheets and curl up in large cardboard boxes.

As children grow, they begin to combine elements as they design their environments. They drape the sheet over the card table to enclose the space completely. They arrange several boxes together. They begin to "furnish" the environments they design, bringing in their favorite things. They create their own spaces and exert control over them.

Hart's initial focus is on structures that children build themselves. He then expands his focus to include children participating with adults in designing real spaces. He identifies several benefits to children that accrue from this kind of design work. They...

- discover principles of spatial relationships;
- establish one's place in the world by giving shape to it;
- gain a sense of control over the world;
- work with others to develop shared goals;
- develop confidence in the use of the environment to carry out one's goals;
- cooperate with others to shape a shared environment;
- develop a sense of involvement in and responsibility for the "real" world.

In Hart's view, a goal of childhood is preparation for democratic responsibility and effective citizenship, and that requires the development throughout childhood of the capacities listed above.

A major goal of public education in a democracy is to develop an effective citizenry. That job is entrusted primarily to the social studies curriculum. Benenson (2001) has analyzed design technology contributions to the major curricular areas. He points to one general success of the social studies curriculum: the socialization of children to accept the cultural and political norms of the society. Such socialization is one part of producing good citizens. There is a second, more active part to good citizenship—to be alert to shortcomings in the status quo and committed to transforming social situations for the better. The social studies curriculum is far less successful in this task, since it is more apt to focus on learning content rather than on analyzing and transforming social situations. *Designed Environments* projects situated in the child's own environment provide balance to the traditional social studies program in this regard.

Carol Gilligan studies social and moral development from a feminist perspective. Although her starting point is quite different from Hart's, she too is very concerned with the sort of people we become. Much developmental theory, based primarily on the study of males, has emphasized the development of independence and of concepts of individual rights and justice. Gilligan's study (1982) of women's development has resulted in a different set of equally important characteristics that are the goal of development through childhood:

- caring for self and others;
- taking active responsibility for conditions in one's world;
- having a sense of responsibility to see real troubles in one's world;
- having a sense of responsibility to alleviate real troubles in one's world.

Gilligan suggests that full development for both sexes entails both strands of development—an integration of rights and responsibilities. *Designed Environments* projects provide a rich context for this kind of development. They help children recognize problems in their school environment and then motivate them to work together and implement solutions.