Overview for Teachers and Mentors

Why This Course?

One aim of education is more important than any other: *Helping learners make more sense of reality*.

Reality is overwhelmingly complex. To cope, learners need conceptual tools to order and connect experienced phenomena. The study of *systems*—their components, internal and external interactions, and changes—provides those concepts.

System concepts, once understood, simplify the study of every academic discipline, every school subject. *Introduction to Systems (IS),* helps learners construct for themselves the conceptual tools to sort and analyze every aspect of the world surrounding them.

A retitled and revised version of *Connections: Investigating Reality*, *IS* provides about a year of sequenced activities for adolescents and older learners.

The course's main focus is on the entities that shape ways of life and human history--societies.

The activities in *IS* help learners construct a permanently useful "master mental model" for describing and analyzing organized human groups, clarify their own sociocultural conditioning, guide their explorations of intercultural interactions, and contribute to an understanding of the dynamics of change.

A primary focus on societies, of course, makes *Introduction to Systems* a "social studies" course. However, by focusing on reality, *IS* breaks down the artificial, arbitrary boundaries between fields of knowledge, boundaries that block understanding. As our subtitle indicates, science and humanities are important parts of the course.

Course Materials

Unlike most textbooks and courses of study, *Introduction to Systems* has relatively little "read and remember" narrative. The ideas put forward are few and important, are interrelated, and together provide a framework to sort out and organize the universe of information which cultures generate.

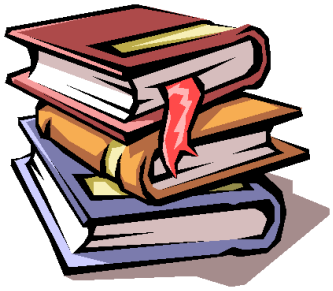
***Introduction to Systems* is different from typical course materials in several ways:**

- **First, active learning is used almost exclusively in the activities** ("Investigations"). Learners are pushed to generate both answers to questions and the questions themselves. For a quick summary of the major characteristics of active learning, check out Slideshow #3, "Passive or Active Learning?" http://www.marionbrady.com/Slideshows.asp.

- **Second, the investigations in *Introduction to Systems* are directed primarily by learners themselves, with minimal guidance from teachers or mentors.** They're encouraged to bring their own ideas and skills to each investigation, and to take whatever time is necessary to complete each investigation, free of pressure to "cover the material."

- **Third, instructional activities either deal with reality itself, or, when the reality being studied is distant in space or time, what's provided is minimally-mediated evidence from that reality—primary sources**.

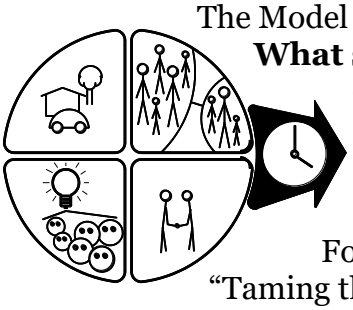
  Most textbooks are compendiums of *conclusions*. The information, already processed, leaves learners little to do but try to remember it—at least until the threat of a test no long looms. Complex, challenging thought processes aren't required. It's much like handing learners crossword puzzles with all the squares filled in. Conventional textbooks actually block high-level cognitive processes.



- **Fourth, because the most important culture learners need to understand is their own, *Introduction to Systems*' Investigations make use of the resources directly available to learners—their immediate, directly accessible environment.**

- **Finally, *Introduction to Systems* is unapologetically "constructivist."** It assumes that the most valuable takeaway from study and experience is a conceptual structure or framework—a single, coherent, logically integrated, systemically related cluster of concepts which, intentionally brought to bear on particular realities by users, leads to understanding.[1] We call this structure "The Model." It's introduced in Unit 2, "Systems and Societies."

[1] A survey of the most popular math, science, language arts, and social studies textbooks used by 8th graders yields nearly 1,500 main ideas "covered" in a single year. This, of course, is ridiculous.



The Model generates organizing questions to guide learner investigations**: What system is this? What are its most significant parts? How do those parts relate and interact? What's the system's environment? What forces drive it? How does it evolve or change over time?** These kinds of questions generate myriad subsidiary questions that drive the inquiry process.

For another look at this system-based Model, see the slideshow "Taming the Fire Hose," at http://www.marionbrady.com/SlideShows.asp.

Contents

Each of the five parts of *Introduction to Systems* are downloadable (PDF files), accessible at http://www.marionbrady.com/IntroductiontoSystems.asp:

Part 1: "Thinking, Patterns, Relationships"

Part 2: "Analyzing Systems"

Part 3: "Societies, Shared Ideas, Action Patterns"

Part 4: "Demographics and Setting"

Part 5: "The Dynamics of Change"

Learner materials may be printed into hard copy, projected via digital projector, or viewed on a Smartboard. (On request, we'll supply links to "learner material only" files, for download onto learner's computers or pads.)

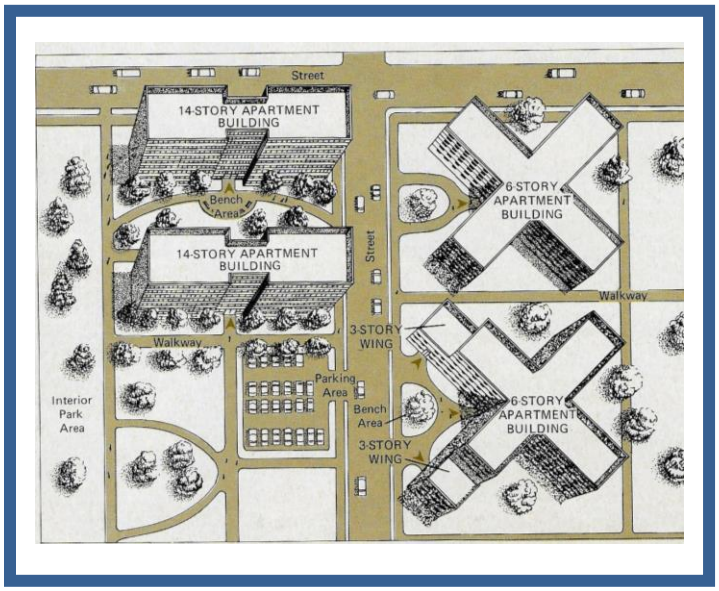
How to use *Introduction to Systems*

Introduction to Systems (*IS*) is designed to yield approximately one year of academic work, linking and relating fields of study the traditional core curriculum treats as stand-alone courses.

As Albert Einstein pointed out, problems can't be solved using the same kind of thinking that created them, from which it follows that the activities may seem unorthodox. What's required is primarily teacher willingness to back away from the usual role of "expert." *IS* is genuinely learner centered, so learners must be allowed to lead and be given time to do so without thought processes being short-circuited by teacher-supplied answers. Dialogue is essential. Learners must be encouraged to talk, argue, defend positions, struggle with issues that often have no good or right answers. Reality as it presents itself "raw" is the richest possible learning resource or "textbook." The most productive role the teacher can play is that of "co-learner."

Procedures (A Summary)

1. Small group dialogue is most productive, not least because it allows participants to "think out loud" in a minimally threatening environment. It should be used routinely. (See later discussion.)



2. In the materials for learners, often primary sources are the major focus of attention—the phenomena to be analyzed and interpreted. **They're enclosed or framed, e.g.: ►**

3. ***"Do this" instructions for learners are in bold-face italics.***

4. Learners should keep journals or portfolios on computers, in loose-leaf notebooks, or combinations of the two, with entries corresponding to the activities. (More on this on p. 7.) Computers are helpful, but certainly not essential to success using *IS*.

5. Teachers and mentors play a non-traditional role—not delivering information or serving as expert sources but as askers of occasional questions that prompt deeper learning about the task at hand.

6. Each unit ends with an investigation that applies the principle investigated in the unit to the learner's own immediate, "here and now" experience**. In a recent review of similar materials for world history, co-author and teacher Ignacio Carral said that he's had improved success with poorly-motivated learners by inverting the sequence, and beginning the unit with the present-day application before moving to the primary source materials.**

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We favor heterogeneous classes with learners in the range of grades 7-10. However, experience and feedback from users tell us the materials can work with learners outside this range.

We believe in team teaching—two or more teachers with differing academic backgrounds, willing to discuss (model) their differences in productive ways in the presence of learners. *IS* erases the arbitrary boundaries between fields of study, demonstrates their mutually supportive nature, and gives team members a shared conceptual foundation and "language of allusion."

In this era of rapid social change, mobility, and social instability, we think there's merit in multi-year assignments of teams to fixed groups of learners.

We recognize that some requirements of the conventional school world—seat time, detailed lesson plans, core curriculum standards, and the like—are at odds with student-centered learning. Active learning necessarily conflicts with conventional views of education proceeding linearly in quiet classrooms with students sitting, facing front, and listening carefully as teachers "deliver" information. Administrative understanding and support for teachers using *IS* is therefore essential.

In our experience, so-called "direct" instruction and "scripted" presentations are a waste of time, even counterproductive. When no two learners are identical, no two learners learn in the same way, no two learners have the same past experiences, no two learners are in exactly the same situation, and no teacher or administrator knows what lies ahead for themselves, much less for the young, the drive to super-standardize instruction makes no sense except for the manufacturers of standardized tests.

Getting Started

We've included introductory materials in Part 1. Learners unfamiliar with active learning may have difficulty moving from traditional passive learning to the kinds of active learning required by our courses, including IS. At the request of an educator piloting an earlier version of our materials, we developed these beginning investigations.

When teachers used earlier course materials that required kids to develop their own conclusions based on "unprocessed" data, some resisted. Those with good short-term memories, comfortable playing the "remember this" game, sometimes said, "Just tell me what you want me to know." On the other hand, learners turned off by traditional schooling often made the transition to activities like those in *IS* happily.

To illustrate active learning, at the beginning of Part 1 we show learners photographs of two suburban U.S. houses built in different decades and ask them to identify differences, speculate about the probable effects of those differences on neighboring, then consider the thought processes involved in making sense of real-world experience.

Small groups

Learners learn most thoroughly by way of extended, small-group dialogue. Careful guidance will, of course, sometimes be necessary. See https://www.teachervision.com/pro-dev/cooperative-learning/48531.html. Domination of a group by one or two members should be discouraged, and occasionally a suggestion may help a group past some kind of conceptual or operational roadblock.

Teachers or mentors must, of course, occasionally intervene to ensure that learners stay focused on the investigation in progress. Although active learning is stimulating and therefore ordinarily enjoyable, *IS* classes mustn't be allowed to devolve into unstructured "do your own thing" sessions.

Investigative Procedures

To work with Investigations, encourage each group to develop a systematic approach to problem solving, such as:

1. Define the task by identifying the main and subsidiary questions to be answered. As the work proceeds, the questions may change, and new questions may arise. Note that the Model, once developed, becomes the main source of general questions, although each investigation will require its own, more specific questions growing out of the Model.
2. Explore ways to find answers—direct observation, experiments, surveys, direct or written questions to authorities, and the like. Information from the library or Internet should be secondary.
3. Interpret the data and develop conclusions.
4. Prepare and present reports, tables, photos, diagrams, written statements of the problem, procedures and conclusions.

Note the applicability of computer skills to each step of the process, particularly Step 4. (Properly used, computers are helpful, but not essential.)

As learners become more skilled at project planning, the management process should be refined, especially for larger tasks, to include steps such as creating a schedule for each investigation, and conducting public (i.e. full classroom) project reviews, particularly at the end of investigations.

Journals (Portfolios)

Each learner maintains a personal journal to document investigation activities and conclusions. Using a standardized investigation procedure such as that described above will help. The journal may either be entirely hard copy, entirely electronic, or some combination of the two. Some information recorded in journals will, of course, be created by work groups, and some by each individual. Make sure enough individual work is done to build and evaluate learner skills.

The journal/portfolio will be a primary resource for evaluating learner performance, and for evaluating and enhancing skills, especially those used for communicating. With proper guidance, the journal can become a way to improve writing skills.

Encourage use of photographs as part of journals. The ease with which digital photos are made and inserted in computer-based journals makes them a natural means of transmitting information. Creating and using other kinds of graphics should also be encouraged.

Project-Based Learning

What's being said about and done with project approaches are inherent in *IS*, and should be central to education in general: (1) Emphasis on use of critical thinking skills (2) emphasis on collaboration, and (3) communicating plans, processes and outcomes effectively to others. Elements (1) and (2) grow rather naturally out of hands-on investigations and reality-based problem solving. Journals provide the

core of element (3), but additional communications—presentations, dialogue, posters, student-made slideshows or videos, etc.—can and should grow out of Investigations.

Internet

The Internet is a learning resource, providing ready access to nearly unlimited information, but it often presents the same problem as conventional text and reference books. It offers pre-processed information and conclusions that limit learner thinking. The activities in *IS* don't call for finding answers obtained from the Internet or other pre-processed resources.

Some Internet resources (e.g. Google Earth ®), perhaps used in unconventional ways, may be used as the basis for investigations. But simply looking up answers to questions, then moving the information from the Internet (or a library book) to the learner's memory or journal is largely a waste of time and should be avoided.

Lesson Planning

As noted earlier, there's a fundamental conflict between conventional bureaucratic expectations for teachers and the kind of active and project-based learning central to *Introduction to Systems*. The crux of the matter: **If a concept or idea is truly important, but learners are struggling with it, there's no point in moving on until the idea is solidly grasped.**

Requiring teachers to plan lessons days or weeks in advance may give administrators or non-educators a sense of satisfaction that schooling is proceeding smoothly, but it's at odds with effective teaching and learning—a product of the traditional curriculum's lack of sound theory, organization, sense of relative importance, and reluctance to trust teacher and learner judgment.

Website Support

For many Investigations, additional information may eventually be available at our website: http://www.marionbrady.com/IntroductiontoSystems.asp. See the "Discussions and User Feedback" box at the right of the webpage. Those using *IS* are invited to contribute to this part of the program, sharing experiences, insights, even alternative activities. Additional subject-area-related investigations are also on the website.

Right Here, Right Now

Within each Part of *Introduction to Systems* is one or more investigations of the "Target Area." For most learners, this will be the school and its immediate environment. The "RHRN Project" symbol (left) is used to highlight investigations. Focusing on the target area has several advantages:

- It's accessible.
- It's sufficiently complex to challenge every learner.

- It's a *system*, with a full range of interacting components: Energy, raw materials, waste, teachers, learners, objectives, assumptions, money—an extensive list, with multiple interrelationships.
- Applying what's being learned to a real and immediate slice of reality emphasizes its relevance.

Evaluating Learners

"How do I evaluate?" (Translated, the question usually means "How do I determine and defend the grades I assign?"). We believe grades are crude, even counterproductive tools deemed necessary because traditional schooling is so often seen by learners as irrelevant or boring. Unfortunately, the practice is too embedded in bureaucracy and public expectations to discard. It's also a source of teacher vulnerability, so much so that the fans of the "standards and accountability" reform effort have been able to use it to undermine public confidence in teachers and promote mass, standardized testing and "sell" the need for privatizing the institution.

The answer to the grading question is easy or difficult depending upon what one is trying to evaluate. Traditionally, grading has been relatively easy, and remains so for those who believe that educating is primarily a matter of delivering information. For them, evaluation generally means, "How much do you remember?"

Recalling, of course, is just one of many thought processes. That recall (and low-level application) are the only processes that can be quantified with enough precision to allow machine scoring goes a long way toward explaining their extensive—even exclusive—use. When the list of thought processes needing to be evaluated is extended, their complexity makes clear the necessity for subjective judgment. This must be accepted as unavoidable.

Introduction to Systems assumes small-group or teamwork as a means to the end of maximizing the benefits of dialogue and "thinking out loud." It also assumes learners will keep journals, that instructional activities will involve a complex mix of thought processes, and that the teacher plays the role of co-learner and "guide on the side," rather than "sage on the stage." It also allows continuous monitoring opportunities—sufficient to eliminate the need for periodic testing. Minimizing teacher talk creates more time for listening to learner exchanges, for noting facial expressions, for interpreting body language, for reading student journals as they're being written, for evaluating arguments as they're being offered, for getting a feel for team dynamics, and so on, all in real time.

There's no substitute for the intrinsic satisfactions of learning via human interaction, and no substitute for continuously evaluating learner performance.

(For more on this subject, see *What's Worth Learning?*, p. 89ff. Free download: http://www.marionbrady.com/documents/WWL.pdf).

Forget periodic testing …unless custom or authority require it. If such is the case, keep certain general principles in mind:

- Don't call the test "a test." Don't call it anything. Just treat it as yet another learning activity to be completed alone rather than with teammates.
- Keep the directions simple. Some dependence on verbal comprehension will be unavoidable, but even the most difficult task should be described in plain language.
- Make the task self-contained—not dependent on remembering an earlier activity.
- Never lose sight of the overarching instructional aim: making more sense of reality. What needs to be known is what the kid does when dealing with the unfamiliar. What questions is the learner asking? What thought processes are being used? What relationships noted, traced, explored?

For example:

"Almost certainly, the neighborhood or area where you live is changing—gradually getting dirtier or cleaner, prettier or uglier, safer or more dangerous, etc. If you want to know why, what questions will you ask?

"This is Monday. I'll ask for your lists of questions next Monday."

For example:

"I'm giving each of you three pennies. Imagine yourself a thousand years from now, digging the pennies up. You know nothing at all about America, and don't understand any of the words on the pennies. Write as much as you can about the society that created them.

"Think about this for a couple of days, then we'll talk about a due date for the assignment."

For example:

"Choose one of the following policies and draw a flow chart identifying its probable or possible local consequences, the consequences of those consequences, and the consequences of *those* consequences:

- "Every family must grow at least one quarter of the food they eat.
- "Each person can generate no more than one pound of waste per week that can't be recycled.
- "No able-bodied person can use an energy-consuming vehicle for a commute of less than a mile."

Complications

The assumption that the primary source of learning is a textbook is so firmly engrained in American education that change will be difficult for everyone involved—learners, parents, administrators and teachers.

If the learning mode is passive and based on memory, the teacher can be the fount of knowledge, the hero, the story teller, the guru. The learner is the absorber of knowledge, the disciple. These roles are satisfying to many teachers, and familiar to all learners. On the other hand, if the learning mode is active investigation, roles are different. Instead of providing answers, the teacher must be a source of occasional questions that push learners to create information themselves. If a teacher gets impatient and provides answers, the investigative process is short-circuited.

As noted earlier, learners must also change, must take a more active role in learning. Both teacher and learner may resist. The changes aren't easy, but are worth the effort.

Expansions

Additional activities closely related to traditional courses are offered in documents linked at Introduction to Systems (marionbrady.com), "Additional investigations linked to core disciplines." Suggestions for a wide variety of projects—enough for a year of supplementary investigations in science, for example, are included there.

Finally

With *Introduction to Systems, Investigating American History, Investigating World History,* and *Investigating World Cultures*, we've tried to create programs that illustrate best practices, to raise awareness of the potential of General Systems Theory to organize information in ways that simplify teaching and learning, and to encourage examination and acceptance of the enormous potential of the approach to organizing information and sense-making that the young begin to use at birth and demonstrate mastery long before kindergarten.

To encourage examination of the instructional materials, we've also done our best to make everything meet traditional expectations and bureaucratic constraints.

And everything is absolutely, unconditionally free for educators to use with their own learners. No strings.

The world changes, necessitating curricular adaptation. We believe classroom teachers, working together—not commercial publishers—are best positioned to continuously adapt and improve the general education curriculum. To that end, we'd like to see formal provision made for an "open source" approach to the general education curriculum, and continuous, cross-cultural user dialogue.

Download links for *Introduction to Systems.*

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