ROCKY MOUNTAIN

Alchemy

TURNING THE PLAIN
INTO THE PRECIOUS

LEARNING SEQUENCES

VERSION 1.2

WHITE PAPER

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Learning Sequences

Introduction

Learning sequences are structured flows through which learners are guided to achieve the objectives. The selected sequences presented here are not an exhaustive list, but do represent the most common sequences in use today online and in the classroom. This section has more of an online focus, however these learning sequences also apply to the design of instructor led training.

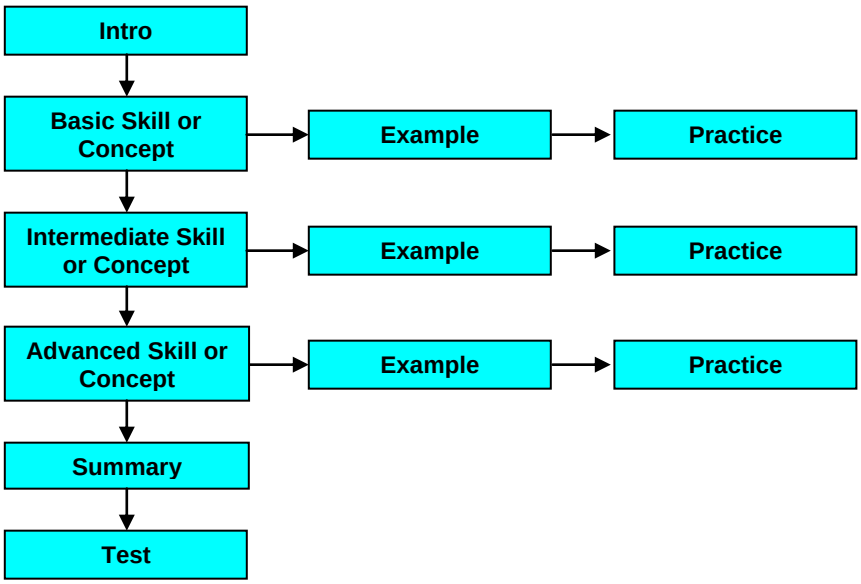
NOTE: In the following pages, each "block" may either be a single screen or a complex combination of navigation models. For example, in a classic tutorial, a practice block could represent a single multiple choice question or it could represent a complete, immersive simulation consisting of multiple screens tied together with various navigation models.

NOTE: Most sequences presented in this section are derived from Horton (2000) and Alessi & Trollip (1985 & 2001).

Classic Tutorial

Intro

The classic tutorial is probably the single most common approach used in training. Classic tutorials present information in a fairly linear structure, providing instruction, an example, then an opportunity to practice. The tutorial flow builds from simple to complex (e.g., the initial case may be cut and dry, while the complex case may require conflicts or complex configuration).



Guidelines

- The Intro should accomplish the following:
  - Present objectives.
  - Stimulate prior knowledge
- Use frequent questions and interactions throughout the tutorial, not just during the practice.
- Select examples that clearly represent the skill or concept. Use "non-examples" as needed to clarify.
- Select/design practices that reinforce the objective and instruction.
  - A common mistake is to select a realistic scenario, only to later realize the instruction did not appropriately prepare the learner for the case.
- Build to the complexity of the terminal learning objective (typically in alignment with the fidelity of the real world).
  - More or less "builds" may be needed depending on the:
    - Complexity of the skill or concept, AND
    - Existing knowledge & skill of the target audience.

Example

Selling a product:

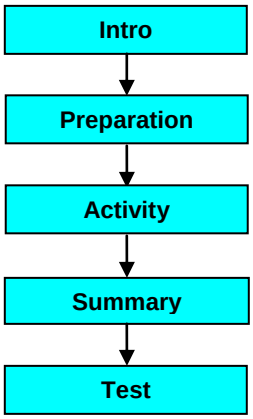
- Begin with product basics (intro).
- Tie to sales model and/or similar products (stimulate prior knowledge)
- Run through a simple sale of the product (basic).
- Build in complexity to include handling objections (intermediate).
- Build in complexity to include handling objections, working with product interactions, performing a complex configuration of the product, and handling order problems.
- Summarize the key points from the learning.

Activity Centered Tutorial

Intro

This type of tutorial is based on a primary activity designed to have the learner achieve the objectives through completing the activity.

NOTE: This approach is very similar to problem based learning, where a problem is presented which the learner must solve by accessing resources, interviewing experts, creating solutions with trial and error, etc.



Guidelines

- Use the Preparation to provide the necessary knowledge or guidance where to go for resources required for the activity itself.
- Select/design the activity to match the objectives.
  - Activities may either be high fidelity to the real world (e.g., interactive role plays) or may just have high transferability between the activity environment and the real world (e.g., running a fictitious company, then using the Summary to tie the activity learnings to running a team or department).
- Make sure the learner is properly prepared for or guided/coached through the activity.
  - The motivational outcome of the activity should be a feeling of accomplishment. This is achieved by making the activity challenging, but not impossible or frustrating, and by making sure the learner has everything needed to complete the activity.
  - If the activity requires resources to complete, make those available (possibly in simplified form).
  - If the activity is not intuitive, consider providing a brief guided practice before immersing the learner into the activity.
- Use the Summary to present what the learner should have

discovered through the activity.

  - In discovery based learning, this may be achieved through reflection opportunities.

- Make sure the test matches the objectives and that the activity properly prepares the learner for the test.

Example

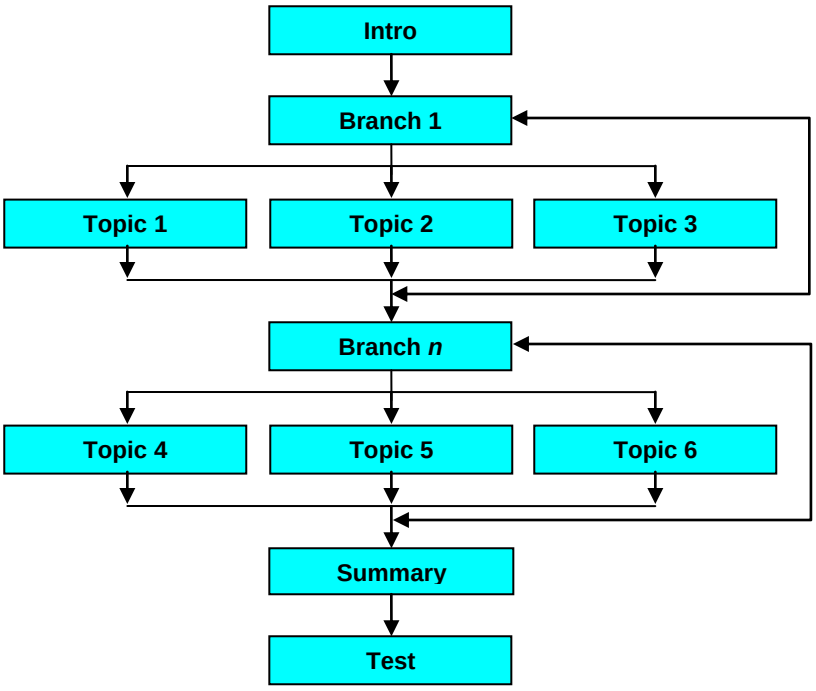
Sales role play with access to all tools and resources.

Learner Customized Tutorial

Intro

Learner-customized tutorials branch according to the knowledge or choice of the individual learner.

- Prescriptive learning (i.e., based on the results of a pretest, the learner's path through the training is "prescribed") is one family of learner-customized training.
  - In this case, a design choice is made whether to automatically branch the learner to the prescribed material or to merely provide recommendations and allow the learner to chose his/her own path.
- Another family of learner-customized learning is providing free choice to select modules, lessons, or topics based on interest.
- The final family is to branch the learner based on job function, location, or some other set criteria.
  - In this case, a design choice is made whether to automatically branch, or allow the learner to select one or more paths from a "branch screen."



Guidelines

- If allowing learner selection, provide enough information about the paths to allow the learner to make an informed choice of paths.
- When designing multiple parallel paths, be sure to provide any "prerequisite" knowledge before the pathing, and to avoid referencing information from an optional path in future pieces.
- For learner selected paths, consider allowing the learner to return to the branching screen to either select another path or continue on to the next piece of training.

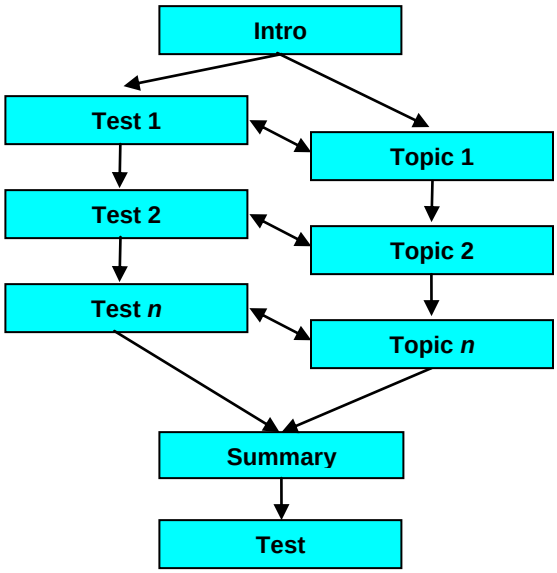
Examples

- System training where there are regional differences – branching based on region.
- Complete soup to nuts product training to multiple audiences requiring different pieces of information (e.g., all audiences need the overview, only sales people need the features and benefits, and only technicians need troubleshooting) – branching based on job function.
- Training is being delivered to an audience with a wide range of experience, from complete novice to expert – branching is based on learner choice or pretest performance.
- Training is organized by concepts or topics, and does not have an inherent required order – branching is based on the interests & desires of the learner.

Knowledge Based Tutorial

Intro

A variation of the prescriptive family of the learner-customize tutorial, this approach allows learners to skip topics, lessons, modules, or even entire courses based on their performance on one or more pretests.



NOTE: The diagram above illustrates a separate test for each topic, however the same outcome can be accomplished with a single multi-section test.

Guidelines

- Consider using test item pools and response randomization to reduce cheating or test memorization in the field.
- Avoid using the same items in the pretests and posttest (this fosters item memorization over objective mastery).
- Make sure pretests are valid (i.e., they test the objectives and are representative of the objectives).

Example

Training is being delivered to an audience with a wide range of experience, from complete novice to expert – branching is based on learner choice or pretest performance.

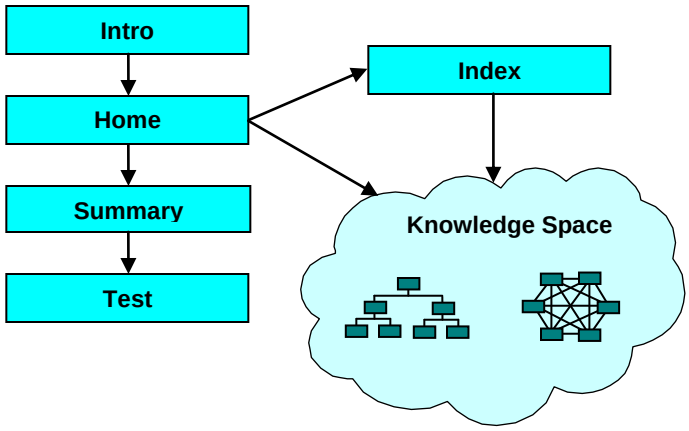
Exploratory Tutorial

Intro

Exploratory tutorials provide even more learner control than the learner-customized tutorials, and may be considered a close relative to activity based tutorial approach. Instead of selecting topics or paths, the learner is given a home base, then explores a knowledge space (a defined collection of resources, an open research environment, or a combination of these).

The exploration may be "launched" by providing the learner with a research question (problem based learning), or may ask the learner to develop his/her own research question. The launch may even be as open ended as to let the learner explore the knowledge space to define his/her research question, then do further exploration to resolve the question.

NOTE: An exploratory approach is in alignment with the constructivist approach to learning which emphasizes that learners create their own unique mental models.



Guidelines

- Because of the high level of learner control, consider providing rapid navigation to the home page to prevent learners from getting lost in their explorations.
- Do not limit the knowledge space to only information; include examples, demonstrations, exercises, newsgroups, forums, online discussion groups, chat archives, electronic reference documents, brochures, etc.
- As with activity based tutorials, provide clear directions, set expectations, provide a time recommendation (e.g., "you should spend no less than *x* hours, but no more than *y* hours exploring the knowledge space for this session"), and indicate what will be covered

in the test prior to "letting the learner loose."

- Create multiple navigation strategies to access content in the knowledge space (e.g., web links, menus, conceptual image maps, mind maps, indices).

Examples

- Training designed to familiarize the learner with all the resources available on the job.
  - In this case, the goal is to know how to use the resources, rather than to memorize specific information.
- Professional development opportunity where the learner sets his/her own goals.

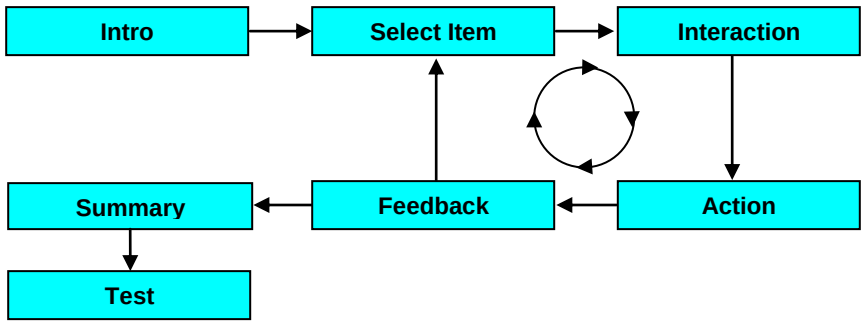
Drill & Practice Tutorial

Intro

Drill & practice tutorials are used to repeatedly exercise a simple or small area of knowledge (e.g., flash cards used in math or foreign language study). Drill & practice strategies can be used to create fast-paced games both online and in the classroom.

NOTE: Although drill & practice typically receives a cold reception in the learning community, it is a useful strategy for helping memorize facts learners must be able to recall reliably without hesitation, e.g., sign language, symbols, rules, syntax (Horton, 2000).

NOTE: Drill & practice alone must typically be combined with another instructional strategy to achieve objectives.



Guidelines

- Increase the difficulty level as the learner progresses.
  - Achieve this by either increasing the difficulty level of the item or by reducing the amount of time or reliance on resources.
- In a flash card design, consider designing a strategy to place missed items back into the deck (this is called a "retirement strategy").

Example

Flash card exercise for memorizing features and benefits of products, system function keys, USOCs and FIDs, etc.

Simulation Based Learning

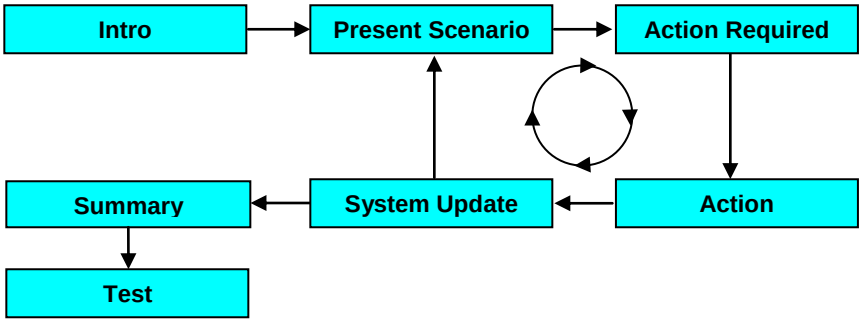
Intro

Simulations are *models* of the real world phenomena or tasks. Alessi & Trollip (2001) say about simulations in training that they are "perceived as more interesting and motivating than many other methodologies, a better us of computer technology, and more like 'learning in the real world.'" The downside of simulations is that they are typically much more time and cost consuming to create (although new tools like RoboDemo and SoftSim are making them more cost effective to create).

There is a wide range of activities that constitute simulation... the easiest way to divide them into classes is by the level of fidelity or realism to the real world.

- Low fidelity simulation: Interactive demo with one path and little or no actual branching.
- Medium fidelity simulation: Interactive emulation with limited branching to address common errors, basic complexity, and/or multiple paths.
- High fidelity simulation: Fully simulated environment with complete branching and real world complexity.

NOTE: Even within these basic categories, there is much room for variation. When designing a simulation, be sure to set expectations with your client early on in the project with either a similar demo or a prototype. Prototypes should illustrate the capabilities as well as the limitations of the simulation approach.



Guidelines

- High fidelity is not always the best approach for a simulation. Introducing too high a level of fidelity too early in the learning process can actually frustrate your learner rather than teach the objective.
  - If high fidelity is desired due to the criticality of the objective or the complexity of the real world, build to the appropriate level (e.g., begin with a simple case, high guidance, and instructional/corrective feedback, then continue to increase complexity while reducing guidance).
- Select cases that illustrate key objective points and help clarify decision points.
- Consider strategies to reduce the amount of learner time required to complete the scenario (e.g., transitions to allow the learner to complete the critical tasks while "skipping" more tedious tasks or to allow for rapid passing of time, incorporate sequencing interactions to skip through steps).
- For system training, try to accurately match the behaviors (e.g., if the user should click a button, have the learner click the button rather than select the button in a multiple choice interaction).
- Consider incorporating natural feedback for correct responses and artificial feedback as instructional/corrective feedback (e.g., if the learner clicks on the correct button, display a new screen capture with the results of that click (natural); if the learner clicks on the wrong button, display a text message (artificial) stating what the learner should have done).

Examples

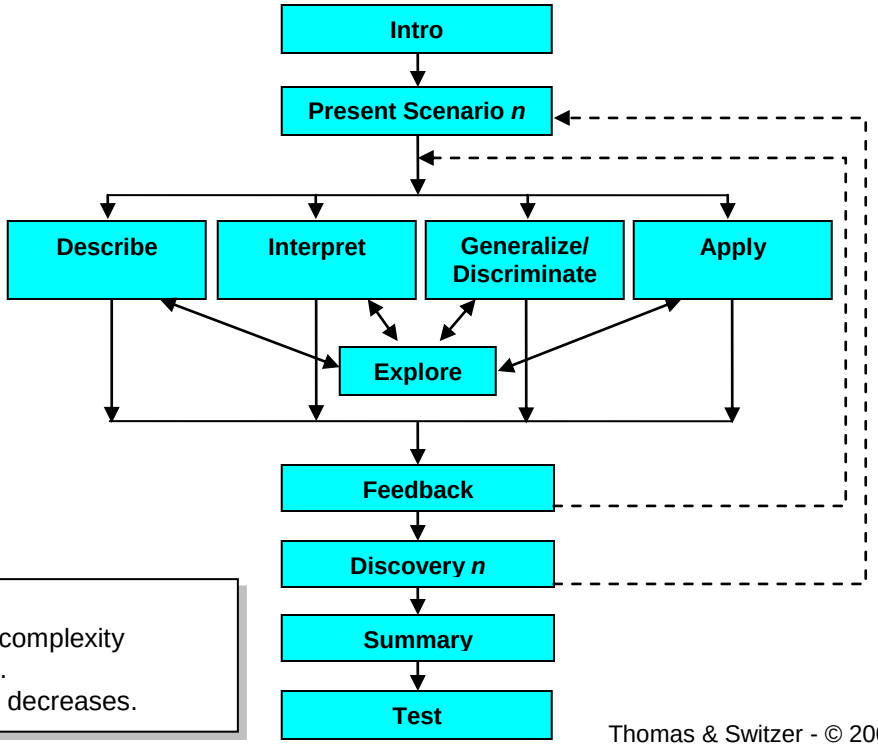
- Simulate only the customer interactions required to sell a product (i.e., an online role play).
- Simulate only the system activities required to order and configure a product.
- Simulate the simultaneous customer interactions and system activities required to sell a product.
- Simulate an office environment that allows the learner to apply (or explore) a new policy.
- Run the learner through a day in the life of a new position.

Discovery Based Learning

Intro

As with the more exploratory strategies, this approach is in alignment with the constructivist school. The underlying principle of discovery learning is that learning occurs when the learner must use his/her mental processes to figure out or "discover" the meaning of something for him/herself.

This particular discovery based learning model evolved from the simulation structure. The scenario is introduced (Present Scenario *n*), then the learner receives a cue to perform an action, an interaction that requires description, interpretation, generalization/discrimination, or application. As with problem based learning, the learner can explore resources to complete the interaction. After completing all the steps of the scenario (or simulation), the learner is guided through a discovery step, where he/she reflects and builds meaning. A new cycle is presented, building in complexity and reducing in guidance.



As *n* increases:
- Scenario complexity increases.
- Guidance decreases.

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Guidelines

- Follow the basic guidelines for activity centered tutorials, exploratory tutorials, and simulations.
- Build complexity of interactions from describe to application (i.e., these are listed in a hierarchical relationship, building in cognitive complexity) until you have matched your objective.
- This is more appropriate for dynamic environments where rules can be derived from experience (e.g., communication and management situations, human resource policies, complex sales environments).
- Maintain awareness of the learner's role (e.g., is the learner an observer or an active participant?), and keep that perspective constant through the learning.
- To achieve a "guided discovery" approach, guide the learner to your desired outcomes during the discovery phase. To achieve a "free discovery" approach, use open ended questions designed to bring about whatever learnings the learner may reach through the exercise.
  - Guided discovery is more appropriate for certification or when testing is required.
  - Free discovery is more appropriate when the goal of the learning is to create personal strategies and mission statements, as in personal growth.

Example

A new sexual harassment policy is issued. The learner is given a series of scenario-based simulations to work through. During each interaction of the scenario/simulation, the learner can access the policy, review case studies & lawsuits, review characters' stories (e.g., see what happened yesterday), take a look at the situation from multiple perspectives). Upon completing a scenario, the learner is given a set of questions designed to guide the learner toward several learnings (e.g., what appears as a harmless comment may have a painful impact on an individual, a situation can quickly turn into a hostile work environment if left unchecked).

Summary

Key points

The most common learning sequence structures are:

- Classic tutorial
- Activity centered tutorial
- Learner customized tutorial
- Knowledge based tutorial
- Exploratory tutorial
- Drill & practice tutorial
- Simulation based learning
- Discovery based learning

NOTE: These structures are not mutually exclusive. You can combine or nest these sequences to make even more complex and engaging course structures!

NOTE: The classic tutorial is probably the most frequently used structure of all. Even though it is a very flexible approach, many courses would benefit from different approaches. Try this... next time you have a course to design, layout the objectives and brainstorm through how you would apply these other sequences to your course... you might just experience a moment of "AHA!"

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