Checklist Name: Practice App Development

Revision Date: 2013.01.07.14.35

Objective: Degree in 4 + forwarding address.

Reading:

* What the Best College Teachers Do
* Engaging Ideas: The Professor’s Guide to Integrating Writing, Critical Thinking, and Active Learning in the Classroom
* How Learning Works: Seven Research-Based Principles for Smart Teaching
* Getting to Graduation: The Completion Agenda in Higher Education
* Practice Perfect: 42 Rules for Getting at Getting Better
* Talent Is Overrated: What Really Separates World-Class Performers from Everybody Else
* The Cambridge Handbook of Expertise and Expert Performance
* So Good They Can’t Ignore You: Why Skills Trump Passion in the Quest for Work You Love
* The Little Book of Talent: 52 Tips for Improving Your Skills

Skills framework Tasks

* Register a domain with all its flavors
* Create an EC2 work area and public area (talk to Justin)
* Get <domain>.gmail address (talk to Justin about how he is going to handle starcluster)
* Experiment with screen capture movie and voice-over
* Github will be repository (Look up notebook)
* Clean up Tinkering By Design sites
* Create automated tests (see what Adobe does)

What form does a Skills building app have?

* Everything in this app requires a response. For example:

Here is my values statement. Are there any changes?

Here are my goals. Are there any changes?

Do you agree with the following? (Pop up one per session.)

1. Practice moves facts and procedures from my working memory to my long-term memory.
2. Practice improves my speed of retrieval of facts and procedures.
3. My working memory is limited and practice frees it up.
4. Practice is most effective when I spread it over many sessions.
5. Practice will help me achieve my goals.
6. I have control over how much I practice.
7. Practice is more effective when I am focused on the task.
8. I want practice to be challenging, but not overwhelming.

Is this important?

Here are members of the faculty who I know and who know me. Are there any changes?

Here are the people who would recommend me for a job or admission to an advanced program. Are these any changes?

Here are my practice tasks. Are there any changes?

What practice task do I want to do next?

How much time do I want to spend on this practice task?

* Stimulate “Curiosity” by asking topic-specific commitment questions about
* Ask the student to set the “level of challenge”
* facts and procedures stored in long-term memory:
  + Are you interested in improving the speed of your mental calculations?
* Determine “Adequate Information” by asking interesting “priming” questions and finding “bright spots” where student information is correct.

Thoughts for further development:

* Changing the student experience by defining the expectation
* Preparation is practicing enough to be able to recall rapidly and operationally a year from now (like riding a bicycle or singing the fight song)
* Rapid recall is valuable for:
* Named concepts and their properties
* Good approximations of concept properties
* Operational procedures
* Exposing students to example of building a practice program
* Letting users build their own Practice
* Letting users use somebody else’s Practice
* Download from web
* Open a file
* Requires a validated file format for a Practice (XML?)
* Letting users move between Practices – creating a workflow
* Properties of a workflow;
* Start
* End
* Sets of Questions
* w/ Answers
* State that can be saved
* Initial Duration
* Slider for controlling duration
* End of Session
* Coaches/Conductors somehow get people to practice (or do they?)
* Is it the clarity of the assignment?
* Is it the requirement to perform before someone else?
* What is it that coaches do?
* “Interested and listening” – how do you do that with software?
* “Listening to each other” – how do you do that with software?
* Is time management the key?
* Planning the Training (<http://www.brianmac.co.uk/plan.htm>)
* Information Gathering (person details, objectives, performance, event technique, experience, personal bests, competition experience, equipment, competitions intended, competitors (w/pb’s), recent results, competition behavior, other commitments, time available for training (practice), planned holidays, medical limitations, facilities, what can be learned from last year’s performance (good and bad), how serious are you?, what do you expect from this program?)
* SWOT Analysis of the last training program (Strengths – best aspects, why, what was done well and why; Weaknesses – are there gaps, what was not done well and why; Opportunities – how can we enhance this program; Threats – what may prevent us achieving the short and long term objectives?)
* Assessment (personal assessment, assessment against ideal: placement, SAT, etc scores, expectation setting)
* Scheduling Training Periods – (How long a training period do you want? Divide the training period into 6 phases 4,2,2,2,2,1)
* Objectives for each Period (Phase 1. General development of strength, mobility, endurance, and basic technique; Phase 2. Development of specific fitness and advanced technical skills; Phase 3. Competition experience – achievement of in-the-game-goals; Phase 4. Adjustment of technical model, preparation for main competition; Phase 5. Competition experience and achievement of objectives; Phase 6. Active recovery – planning preparation for next season.)
* Activities for each Period include: Basic conditioning, general and specific strength, general and specific technique, general and specific mobility, general and specific endurance, speed.
* Volume, Intensity & Recovery (increase intensity and recovery slowly; decrease volume from high to low)
* Preparing a plan for the above
* Macrocycle (11 months), Mesocycle (4-8 weeks), Microcycle (7-10 days) (see mcycles.xls)
* Goal Setting (SMARTER – Specific, Measurable, Adjustable, Realistic, Time based, Exciting, Recorded; SCCAMP – Specific, Controlled, Challenging, Attainable, Measurable, Personal)
* FITT Principles of training (Frequency, Intensity, Time, Type)
* “Why Don’t Students Like School?” (Update)
  + People are naturally curious, but curiosity is fragile
  + For problems to be solved the thinker needs:
    - Adequate information from the environment
    - Room in working memory
    - Required fact and procedures from long term memory
  + Be sure that there are problems to be solved
  + Respect students’ cognitive limits
  + Clarify the problems to be solved
  + Reconsider when to puzzle students
  + Accept and Act on variation in student preparation
  + Change the Pace
  + Keep a Diary (record student’s level of difficulty for immediate action and for later assessment leading to system modification)
  + Start with a story, lead to through examples to concepts, practice concepts, decompose concepts with stories, repeat.

* Update Skills Thoughts with notes from Kahneman book, Google AdWords saga, and “What the Best…”
* Applying the eight ways to foster learning in an online environment.
  + Let students choose what they want to do, when, level of challenge, and how much. The brand for this idea could be REFLECT and contain the following:
    - Create/Revise statement of personal values
    - Create/Revise my goals (“What the best college students…” suggests is that effort should be directed to the idea of understanding and getting comfortable with yourself if you want to change the world rather than setting goals which is someone else’s definition of success and a path to failure. Perhaps this is better framed as “going with my strengths or my curiosity”)
    - Create/Revise the list of skills that I want to build (perhaps this is better framed as “that I’m curious about”)
    - Create/Revise status of personal strengths (skills)
    - Create/Revise statement of my level of success wrt my goals (perhaps this is trying to get at the wrong thing)
  + Let students select context (Field/Story) for practicing a concept skill.
  + How does one show framework for a concept? (Maybe as background image with success indicators.)
  + Have the student describe concepts as written text and video/audio and assess their level of confidence in their explanation.
  + Practice should be divided into sets – student should receive feedback after every set (90% - 15 min) and be presented with choices (do-over, different skill, done for now)
  + Frameworks, current concept, current skill should have time-on-task indicators.
  + Demonstrate mastery by capturing practice set with a voice-over, video of student doing the exercise, and creating a text transcript of the session. Export set video.
  + Create easy way to email video and explanation (question?) to others (teacher?)
* Building a cloud-based platform
  + RESTful interface provides a good model for a cloud-based architecture (assumes always connected)
  + Client has one of the following for the user interface
    - Html5/JavaScript
    - Android
    - iOS
  + Choices for skills tools
    - Always connected
      * Only need to write UIs
      * Assumes presence of network
      * Up to user which network is used
      * Server-side needs to be quick
    - Sometimes connected
      * Need to write UIs
      * Need to cache data
      * Need to have server-side proxy
      * Sometimes network is present
    - Never connected
      * Need to write UIs
      * Need to cache data
      * Need to have server-side proxy
      * Need to load from a memory stick
      * Might be able to connect to the network
  + Constraints
    - Architecture must be RESTful friendly
    - Server-side must be stateless
    - Server-side must proxy for import/export
  + TechTV/StarCluster server glue might be useful here as state is kept in S3
  + Server-side
    - Video upload, processing, and streaming
    - Audio upload, download, possible streaming
    - Saving/loading User State
    - Saving/loading Global State
    - Transforms
    - Workflow
  + App builders (Server-side and client-side)
    - Content management
    - App management
    - Server-side builder
* Incorporating feedback and assessment for the online environment.
* Processes for adding and removing activities.
* Processes for changing the platform technology.
* Platform features.
* Adding and removing content.
* Program assessment points.
* Program release system.
* Determining Priority for Tasks
* Creating and assessing AdWords ads.
* Student portfolios
* Survey resources
* Math resources
* Reading comprehension
* Writing ability
* Video capture
* Listening (sweeps, phonemes, ear training, note taking)
* Time management
* Decision making
* Critical thinking
* Anthropology Field Training
* Architecture of the experience
* Placement testing
* Business skills
* Elevator speech
* Creating ads for Skills program on Mission Critical web sites.
* Survey help from Greg Harris (student access to summary data)
  + Incoming Freshman Survey, HERI CIRP: <http://www.heri.ucla.edu/cirpoverview.php>
  + Enrolled Student Survey, NSSE: <http://nsse.iub.edu/html/about.cfm>
* Employ Kahn Academy videos. Start with fractions.
  + <http://www.khanacademy.org/math/arithmetic/fractions>
* Incorporate Elevator Speech approach to student video creation assignments. (from MIT Global Education & Career Development)
  + <http://www.careerspots.com/vidplay_links_ext.aspx?aid=486&apas=gX0g16roh4Qwmd6trszN6Q==&vidnum=2&>
* Implementation assumptions:
  + Students access the web based software tools and their personal data through existing mission-critical websites hosted by the undergraduate institutions they attend. The students will also have unmediated, direct access to the web based software tools and their personal data. The web based software tools will be available to all pilot project participants from a common repository. Students will have access to anonymous summary data from all participants for the purpose of assessing their own performance. All personal data will be private unless made public by the student.
* Scalability of the approach:
  + The initial implementation of the project is intended to add students, institutions, and tools on demand.
* Students’ awareness of the tools:
  + In collaboration of participant institutions we will modify mission-critical activity websites for access to the tools. We will use Google AdWords to inform students how to directly access the tools. We will assess student awareness using personal data repository creation rates.
* Students’ interest in using the tools:
  + This particular topic has many dimensions and we will measure each tool for the number of times a student uses the tool and the average length of time that the student spends using the tool. We will solicit feedback from the students.
* The impact of the tools on student retention:
  + There are three important measures of participating student performance that determine the impact of this project:
    - The change in the percentage of entering students who enroll for classes the second year.
    - The change in the percentage of enrolled students who graduate in four years.
    - The change in the percentage of enrolled students who graduate in six years.
* Discovery from Perfect Ear Pro experiment in building music skills:
  + Complex skills should be divided into Simple skills
  + Simple skills should be learned using incremental levels of difficulty
  + Ability to do an incremental level should be measured.
  + Each incremental level of difficulty should have about 10 measurable confirmations that the user must get correct before advancing to the next level.
  + It may be possible to analyze incorrect responses and suggest a useful loop back to the user.
  + Each incremental level of difficulty should be mostly doable after successfully completing the previous incremental level.
  + If an incremental level is measured as “too challenging” after finishing the previous level, then the level should be split into two levels so that there is a challenge, but the challenge is not overwhelming.
  + After completion of a level, it is important for a user to have had fun and feel like something has been accomplished.
  + Interesting attributes:
    - Audible range of frequencies for a user
    - Ability to determine if two frequencies are the same
    - Ability to distinguish distance between notes
    - Ability to determine which of two set of notes have a greater distance between notes when:
      * The sets are close together
      * The sets are far apart
      * The first set is higher in pitch of the root
      * The second set is higher in pitch of the root
      * The sets overlap
      * The sets are at the extreme ends of the audible freq. range
    - The audible range of note duration (shortest note duration for hearing pitch)
    - The minimum detectable volume detectable
    - The number of notes that can be remembered
* Readings from Intelligent Tutoring Systems (DropBox MITx folder)
  + Why Students Engage in “Gaming the system”
    - \* Performance Goals instead of Learning Goals
    - \* Dislike of Mathematics
    - \* Belief that Mathematics is Not Important
    - \* Belief that Success in Mathematics is due to Inate Ability, not Effort
    - \* Lack of Education Self-Drive (Patience/Motivation/Focus)
    - \* Passive-Aggressiveness “pervasive pattern of negativistic attitudes and passive resistance to demands for adequate performance”
    - \* Frustration (leads to lack of persistence)
    - \* Anxiety (Fear of failure?)
  + Using Mixed-Effects Modeling to Analyze Different Grain-Sized Skill Models
    - SAT/GRE question samples knowledge of concept, procedure, or skill
    - Standardized test questions can be evaluated by content specialists to determine required skills
  + Relative Effectiveness of Human Tutoring, Intelligent Tutoring Systems, and other Tutoring Systems
    - It is widely believed as the granularity of tutoring decreases the effectiveness increases. In particular, when compared to No tutoring, the effect sizes of answer-based tutoring systems, intelligent tutoring systems, and adult human tutors are believed to be d = 0.3, 1.0, and 2.0 respectively. This review did not confirm these beliefs. Instead, it found that the effect size of human tutoring was much lower: d = 0.79. Moreover, the effect size of intelligent tutoring systems was 0.76, so they are nearly as effective as human tutoring.
  + Many of these readings are about two particular tutoring systems for mathematics. Both are interested in predicting the performance of pre-undergraduate students on standardized year-end, high-stakes examinations. One of the systems has some tutoring built into the system. Since non-remedial undergraduate students don’t have any standardized examination of this variety these reading don’t offer much in the way of suggestions about how to help content experts craft tutorials.
* Adobe Flex Architecture <http://www.adobe.com/devnet/flex/architecture.html>
  + Android
  + iOS
  + Browsers
  + Question: Is this a viable alternative to writing apps in C?
  + Suppose: Amazon delivery w/ CloudFront and S3 storage
  + Suppose: Occasionally connected
  + Suppose: Android/iOS app delivery
  + Suppose: Audio/Video capture
  + Suppose: Client processing (e.g. audio processing for pitch)
* jQuery Architecture
* Assessment (from Wikipedia)
  + Formative assessment is a range of formal and informal assessment procedures employed by teachers during the learning process in order to modify teaching and learning activities to improve student attainment.[1] It typically involves qualitative feedback (rather than scores) for both student and teacher that focuses on the details of content and performance.[2] It is commonly contrasted with summative assessment, which seeks to monitor educational outcomes, often for purposes of external accountability.[3]
  + Benefits of Formative Assessments for Students
    - Students are more motivated to learn.
    - Students take responsibility for their own learning.
    - Students can become users of assessment alongside the teacher.
    - Students learn valuable lifelong skills such as self-evaluation, self-assessment, and goal setting.
  + Imagine a formative evaluation that would identify qualitative measures (e.g. too easy, not challenging enough, challenging, too challenging) based on quantitative evaluations (e.g. 10 out of 10 answers correct, 8-9 answers correct, 5-7 answers correct, 0-4 answers correct) that would modify activities to be: more difficult, slightly more difficult, same level of difficulty, less difficult.
  + Imagine modification rules 1:
    - More difficult: replace 4 “easy” questions having correct answers with 4 “more difficult” questions; randomize ½ remaining questions by using new initial values; replace the rest with previously “easy” questions if they exist.
    - Slightly more difficult: replace 2 “easy” questions with 2 “more difficult questions; randomize ½ remaining questions; replace the rest with previously “easy” questions if they exist.
    - Same level of difficulty: randomize ½ questions; replace rest with previously “easy” questions if they exist.
    - Less difficult: replace ½ difficult questions with less difficult questions; randomize ½ the remaining; replace the rest with previously “easy” questions if they exist.
  + Optimize for long term skill building
* Bror Saxberg: Cognitive Task Analysis – top performers – survey to design training – feedback after people have graduated – practicing environment – overview, demo, worked example, practice
* A Task-Centered Instructional Strategy – M. David Merrill (Entrepreneur example at end of paper)
  + The task-centered instructional strategy … is a structured approach and represents a form of direct instruction in the context of real world problems. The emphasis is on demonstration (worked examples) rather than on discovery or exploration… This task-centered approach integrates component knowledge and skill acquisition with the doing of complex tasks… for learners new to a content area, integrating component knowledge and skills into whole tasks results in higher motivation and a better ability to apply the newly acquired skill in new situations.
  + The Pebble model is a content-first approach.
    - Identify a typical whole task and produce a fully worked out example of that task that includes:
      * Inputs—the givens of the task;
      * A goal—the identification of the product or activity that results from performing the task;
      * A solution—a set of activities that transforms the givens into the goal;
      * An illustration of the problem-solving process—a representation of someone actually performing the task.
    - Identify a progression of similar tasks of increasing complexity:
      * Each task in the progression should be complete, not merely a step in a larger task.
      * Each task should be a worked example from the set of similar tasks.
      * Each task in the progression, while varying from preceding tasks, requires the same or similar knowledge and skill components.
      * Each task in the progression is a portrayal (worked example) of the task, not merely a description.
      * Each succeeding task is more complex than the preceding task. A more complex task involves more detail for some component skill or more component skills than the preceding task.
      * The following steps have been found useful in specifying a progression of whole tasks (see Figure 4 for an elaboration).
        + Gather a set of specific whole tasks. (It is often possible to video samples of the process.)
        + Identify the components required for each task.
        + Sequence the tasks by putting the least complex tasks early in the progression.
        + Adapt the tasks or select alternate tasks as necessary to facilitate a smooth progression and to best enable demonstration and application of each component skill.
    - Identify component skills common to these tasks. The context for skills is the Knowledge Object that consists of Learning Outcomes, Remembered Information (knowledge), and Application of Information (skill). Here are a set of Learning Outcomes:
      * Information About
        + Knowledge: Remember the Description of an entity
        + Skill: Given a description, recognize a given instance of an entity.
      * Parts-of
        + Knowledge: Remember the names and description of the part of an entity.
        + Skill: For a given entity, locate the parts in the context of the whole.
      * Kinds-of
        + Knowledge: Remember the definition – the property values that define a class of entity.
        + Skill: Classify examples – identify entity portrayals that belong to a specific class of entity.
      * How-to
        + Knowledge: Remember the steps – a sequence of action names and descriptions.
        + Skill: Do the task – execute the actions in the sequence.
      * What-happens
        + Knowledge: Remember the name, description, conditions and consequence for the process.
        + Skill: Given the conditions predict a consequence or given a consequence find missing or faulted conditions.
    - Specify an instructional strategy for task-centered instruction.
      * An Example: Entrepreneur Course with four businesses cases. Students learn the six steps for starting a business.
      * The instructional strategy:
        + Show a new whole task: After a brief introduction the first business, Veasna’s Pig Farm, is overviewed with a short audio/slide presentation.
        + Present topic components: The six steps for starting the business are listed. After the introduction, learners attempt the first step. The defining and ordering properties for this step are shown and the portrayal for this step is shown. Each of the defining properties is identified w/ audio, video, whatever.
        + Demonstrate the topic components: Learners are directed to a property to see the portrayal of this property highlighted in the statement of business opportunity. The student can explore and study these properties and their corresponding portrayals as long as they wish. This strategy is continued for each of the six steps for this first task.
        + Show another new task: after learners have completed the presentation/demonstration for the first business, they are directed to the second business, Instant Service Carpet Cleaning. Briefly review and elaborate the defining and ordering properties for this step.
        + Learners apply: Learners are then directed to apply these properties to this new statement of business opportunity. Provide feedback for their responses to this application.
        + Additional topic components: Elaborate the importance of finding customers who are willing to pay for this new business.
        + Demonstrate additional components: The demonstration of this elaborated property for the carpet cleaning business is described.
        + Repeat the strategy for additional businesses. After learners have completed all 6 steps for the Carpet Cleaning business, they then move on to the retail business and then to the restaurant business. The final application was for students to apply all the steps without further elaboration or demonstration to a fifth business, Kahn Sub.
* Ownership of Your Education
  + Idea: Have the students spend their own money on their own project.
  + Idea: Student research teams pose a scientific question/hypothesis (target), propose an experimental design, perform multi-week investigations and then present their findings in various forms (web, interviews, and papers).
  + Continue until:
    - You don’t want it, and/or
    - You exceed your Affordable Loss, and/or
    - You prove to yourself it cannot be done.
* A Checklist for Checklists (from Atul Gwande’s “The Checklist Manifesto”)
  + Development
    - Do you have clear, concise objectives for your checklist?
    - Each checklist item should be:
      * A critical safety step and in great danger of being missed.
      * Not adequately checked by other mechanisms
      * Actionable, with a specific response required
      * Designed to be read aloud as a verbal check
      * One that can be affected by the use of a checklist
    - Have you considered?
      * Adding items that will improve communication among team members,
      * Involving all team members in the creation of the checklist.
  + Drafting
    - Does the Checklist:
      * Utilize natural breaks in workflow (pause points)?
      * Use simple sentence structure and basic language?
      * Have a title that reflects its objectives?
      * Fit on one page?
      * Minimize the use of color?
    - Is the font:
      * Sans serif?
      * Upper and lowercase text?
      * Large enough to be read easily?
      * Dark on a light background?
    - Are there fewer than 10 pause points?
    - Is the date of creation (or revision) clearly marked?
  + Validation
    - Have you
      * Trialed the checklist with front line users (either in a real or simulated situation)?
      * Modified the checklist in response to repeated trials?
    - Does the checklist:
      * Fit the flow of work?
      * Detect errors at a time when they can be corrected?
    - Can the checklist be completed in a reasonably brief period of time?
    - Have you made plans for future review and revision of the checklist?
* Architecture of Web Site
  + Embed Kahn Academy in web page
  + Post data from browser
  + Post current state
  + Storyboard usage
* Funding sources
  + WHIHBCU
  + Foundations relations (Lumina foundation, Davis Foundation)
* Building traffic
  + Ivan’s email thread on Google AdWords (MIT Finance/Legal)
    - /Users/cshubert/Documents/projects/CompletionSkills/GoogleGrantsProcess/\*.docx
  + Understanding AdWords
  + Facebook/Google+/Twitter
    - Explore profiles w/ idea of determining what a good profile is
    - Find users with similar interests
    - Create a catalog of canned posts (there are probably a small number of types of posts) INTENT: make interesting posts quickly. These should be interesting from the user’s perspective.
    - Visit sites with similar interests and figure out a pattern of
      * Good questions
      * Interesting approaches
      * Interesting topics
      * Identifying competition
    - What is a Facebook App and do we care? How do we “appear” on a Facebook user’s “page”? What is the Facebook SDK? What is an Iframe? What is a Facebook map?
    - Rss feeds? Do we care?
    - What is the latest thing?
* Design Structure Matrix (an approach for having multiple disciplines work together) - <http://www.dsmweb.org/>