DOWNLOAD PDF PRACTICAL GUIDELINES FOR CREATING INSTRUCTIONAL MULTIMEDIA APPLICATIONS

Chapter 1 : Effective educational videos | Center for Teaching | Vanderbilt University

Equipping readers with a firm foundation for creating professional and effective products, the text emphasizes the practical aspects of creating instructional multimedia applications and computer.

Matching modality Signaling, which is also known as cueing deKoning et al. For example, signaling may be provided by the appearance of two or three key words e. By highlighting the key information, it helps direct learner attention, thus targeting particular elements of the video for processing in the working memory. This can reduce extraneous load by helping novice learners with the task of determining which elements within a complex tool are important, and it can also increase germane load by emphasizing the organization of and connections within the information. Mayer and Moreno and deKoning et al. Segmenting is the chunking of information to allow learners to engage with small pieces of new information as well as to give them control over the flow of new information. As such, it manages intrinsic load and can also increase germane load by emphasizing the structure of the information. Both types of segmenting have been shown to be important for student engagement with videos Guo et al. Weeding is the elimination of interesting but extraneous information from the video, that is, information that does not contribute to the learning goal. For example, music, complex backgrounds, or extra features within an animation require the learner to judge whether he should be paying attention to them, which increases extraneous load and can reduce learning. Importantly, information that increases extraneous load changes as the learner moves from novice toward expert status. That is, information that may be extraneous for a novice learner may actually be helpful for a more expert-like learner, while information that is essential for a novice may serve as an already-known distraction for an expert. Ibrahim has shown that this treatment can improve retention and transfer of new information from video. For example, showing an animation of a process on screen while narrating it uses both channels to elucidate the process, thus giving the learner dual and complementary streams of information to highlight features that should be processed in working memory. In contrast, showing the animation while also showing printed text uses only the visual channel and thus overloads this channel and impedes learning Mayer and Moreno, The table below gives a brief summary of how and why to use these practices. Student engagement One of the most important aspects of creating educational videos is to include elements that help promote student engagement. Lessons on promoting student engagement derive from earlier research on multimedia instruction as well as more recent work on videos used within MOOCs. Guo and colleagues examined the length of time students watched streaming videos within four edX MOOCs, analyzing results from 6. In fact, the maximum median engagement time for a video of any length was six minutes. Making videos longer than minutes is therefore likely to be wasted effort. Use a conversational style. Speak relatively quickly and with enthusiasm. Make sure the material feels like it is for these students in this class. One of the benefits for instructors in creating educational videos is the ability to reuse them for other classes and other semesters. Guo and colleagues examined student engagement with MOOC videos that were created by chopping up videotaped lectures that had been presented in a face-to-face class Guo et al. Student engagement was significantly less than when lectures were created with the MOOC environment in mind. While this consideration is important for managing cognitive load, it is also relevant to promoting student engagement. When solving a problem, Khan academy-style videos are particularly helpful, showing students step-by-step with narration how to work through the problem Guo et al. When teaching about an invisible phenomenon, it can be helpful to provide an illustration. In each case, providing visual elements that add to the lesson can not only promote student understanding but also engagement with the lesson. There are multiple ways to do this effectively. Building on work from Kreiner , they had students in some sections of the course watch the video with no special instructions, while students in other sections of the course were provided with eight guiding questions to consider while watching. The students who answered the guiding questions while watching the video scored significantly higher on a later test. Use interactive features that give students control. Zhang and

colleagues compared the impact of interactive and non-interactive video on students learning in a computer science course Students who were able to control movement through the video, selecting important sections to review and moving backwards when desired, demonstrated better achievement of learning outcomes and greater satisfaction. This not only has the benefit of giving students control, but also can demonstrate the organization, increasing the germane load of the lesson. Integrate questions into the video. Tools like HapYak can allow instructors to incorporate questions directly into video and to give feedback based on student response. Make video part of a larger homework assignment. Mary worked with Kathy Friedman to develop videos and follow-up questions to serve as pre-class preparation in a genetics class. Although there was no apparent change to learning outcomes in the class, students valued the videos and post-video questions as learning tools and thought that they were effective for promoting student understanding. The important thing to keep in mind is that watching a video can be a passive experience, much as reading can be. To make the most of our educational videos, we need to help students do the processing and self-evaluation that will lead to the learning we want to see. The particular way you do this should be guided by goals of the course and the norms of your discipline. Summary Videos can be an effective tool in your teaching tool kit. Luckily, consideration of these elements converges on a few recommendations: Keep videos brief and targeted on learning goals. Use audio and visual elements to convey appropriate parts of an explanation; make them complementary rather than redundant. Use signaling to highlight important ideas or concepts. Use a conversational, enthusiastic style to enhance engagement. Embed videos in a context of active learning by using guiding questions, interactive elements, or associated homework assignments. Effects of video podcasting on psychomotor and cognitive performance, attitudes and study behavior of student physical therapists. Innovations in Education and Teaching International 49, Towards a framework for attention cueing in instructional animations: Guidelines for research and design. Educational Psychology Review 21, Cognitive load theory, educational research, and instructional design: Some food for thought. Instructional Science 38, How video production affects student engagement: An empirical study of MOOC videos. Hsin WJ and Cigas J Short videos improve student learning in online education. Journal of Computing Sciences in Colleges 28, Effects of segmenting, signaling, and weeding on learning from educational video. Learning, Media and Technology 37, Exploring the use of video podcasts in education: A comprehensive review of the literature. Computers in Human Behavior 28, Guided notes and interactive methods for teaching with videotapes. Teaching of Psychology 24, Guiding questions enhance student learning from educational videos. Teaching of Psychology 33, Screencast tutorials enhance student learning of statistics. Teaching of Psychology 39, Applying the science of learning: Evidence-based principles for the design of multimedia instruction. Cognition and Instruction 19, Revising the redundancy principle in multimedia learning. Journal of Educational Psychology , Mayer RE and Moreno R Nine ways to reduce cognitive load in multimedia learning. Educational Psychologist 38, Video killed the textbook star? Use of multimedia supplements to enhance student learning. Journal of Political Science Education 8, The effects of technology use in postsecondary education: A meta-analysis of classroom applications. Cognitive load during problem solving: Cognitive Science 12, Some procedures for facilitating learning and problem-solving in mathematics and science. Journal of Educational Psychology 81, Cognitive load theory, learning difficulty, and instructional design. Learning and Instruction 4, Maximising the educational potential of video. Journal of Learning Design 7, The impact of a question-embedded video-based learning tool on e-learning.

Chapter 2 : Applications of Universal Design | DO-IT

*Practical Guidelines for Creating Instructional Multimedia Applications [Peter Fenrich] on calendrierdelascience.com *FREE* shipping on qualifying offers. An excellent instruction manual or handy resource, this text was designed for anyone seeking practical guidelines in creating computer-managed presentations as well as easy-to-understand insight into the.*

Developments in design of such materials seem to have followed shifts in the dominant paradigms within psychology. Early computer-based materials are seen to be influenced by behaviorist concepts while discovery learning materials are felt to be founded on later cognitive models of information processing and constructivism. Designers are adopting a mixed approach to design because it offers complete flexibility Atkins, For example, some business and industry designers reveal a blending of analysis and evaluation of the objectivist approach with simulations and individualized progress of constructivist approaches Dick, Intuition and creativity have played major roles in the development and implementation of constructivist learning environments Dick, for a reason. Until the appearance of the Recursive and Reflective, Design and Development R2D2 model by Willis , there had been almost no articles detailing explicit alternatives to the Dick and Carey objectivist model to help designers create instructional materials based on constructivist theory. Park and Hannafin indicated that the psychological foundation, in general, focuses on how learners think, learn, and process information and is largely media-independent. This foundation is based on research and theory on meaningful learning, schema theory, prior knowledge, hierarchical cognitive structure, elaboration, depth of processing, generative learning, situated learning, conceptual models and metaphors, and dual coding theory. The technological foundation addresses the potential of technology to redefine teaching and learning, the capabilities of specific multimedia technologies, and the capabilities and limitations of interactive multimedia technology. This article explores behaviorist and cognitive approaches to interactive multimedia instructional design ID and delves into the foundations noted in Park and Hannafin Basic concepts of each approach, characteristics of ID, and similarities and differences between each will be discussed. Interface design guidelines for learning with multimedia will be presented, which link theory with practice in effective multimedia ID. The primary tenet of behaviorism is that there is a predictable and reliable link between a stimulus and the response it produces. If behavior is predictable, designers need to identify subskills students must master that lead to a learned behavior, and then select stimuli and presentation strategies that build the subskills. A major assumption is that learners are not just passive entities who react to environmental stimuli. Learners learn by doing, experiencing, and engaging in trial and error. What has been learned, under what conditions, and the consequences that support or maintain the learned behavior all work together, and must be observable and measurable. A second assumption of behaviorism is that learning is a change in behavior due to experience and a function of building associations between the occasion on which the behavior occurs stimulus event and the behavior itself response event. Repeated continuous pairing of the stimulus with the response strengthens learning. To change behavior in an educational setting, learners must be assessed for their needs and capabilities so that instruction is appropriate and meaningful. Observable goals can then be written. Learning tasks are ordered logically according to a hierarchy. Reinforcement, which is contingent on successful achievement at each stage, maintains previously learned behaviors Burton et al. Atkins noted behaviorist ID characteristics with respect to subject matter, sequencing, learner control, and learning. Those are described in the following sections. Subject Matter Material is broken down into small, logically discrete instructional steps and is often presented as a rule, category, principle, formula or definition. Positive examples are given to reinforce understanding, followed by negative examples to establish conceptual boundaries. Activities are sequenced for increasing difficulty or complexity. The sequence and pacing through the material is usually without learner control. To maximize learning efficiency, learners may be routed to miss or repeat certain sections of material based on performance on a diagnostic test, or on tests within the

sequence of learning activities. The amount of practice or revision they require may also vary based on performance. Learning The required operation, procedure, or skill is demonstrated and broken down into its parts with appropriate explanation before learners are expected to copy the desired behavior. Performance standards are made explicit. Learners build proficiency from frequent review or revision with check tests at strategic points or repeat practice with feedback. Design emphasizes low error rate and use of remedial loops back through material, if learner test performance seems to warrant it. Extrinsic or intrinsic reinforcement messages are used to maintain motivation. Atkins concluded that a structured, deductive approach to design multimedia applications can lead to rapid acquisition of basic concepts, skills, and factual information within a clear framework. The effectiveness of behavioral design approaches for higher-order learning tasks or for transfer of learning is yet unproven, however. The diversity is often grouped into two trends: Principles of behaviorism omit the psychology of unobservable mental states or Gestalts and the subjectivity of introspection, both of which are a part of human behavior. Cognitive psychologists believe prior knowledge and mental processes intervene between a stimulus and response that operate to reduce the predictability of human behavior response given a stimulus. Accretion, associated with memorization, involves acquisition of factual information. Schema creation occurs as a result of encountering examples, analogies, metaphors, and tutorial interactions. Tuning or schema evolution involves gradual refinement of existing schema as a result of task practice or concept use Shuell, In multimedia environments, learners construct meaningful knowledge by "selecting words and selecting images from the presented material, organizing words and organizing images into coherent mental representations, and integrating the resulting verbal and visual representations with one another" Mayer, , p. For example, Brown, Collins, and Duguid proposed cognitive apprenticeship as a means of active engagement, which embeds learning in authentic activities and social interactions. Duffy and Cunningham explained those concepts. Discovery learning is not necessary to learn definitions, procedures and outcomes from an existing body of knowledge. In the end, the learner may not mimic the coach, but the learner can defend and the coach can respect the other view. The teacher does not teach students what they should know or set a time for when they should know it. Learner Control Giving learners control over pacing, sequence, and actual content of information presented is based on assumptions that learners know what is best for them and are capable of acting appropriately on that knowledge. If learners do not meet either assumption, then the computer or teacher is given control of content and learner tasks. Assessment in Context of Learning In traditional settings, assessment is done after learning occurs. In a constructivist framework, assessment is embedded within an activity and must be in a context of problem solving. The distinction between learning and testing becomes blurred. Cooperative Learning Groups work together to solve problems. The goal is to share, challenge, and form alternative viewpoints. Herrington and Standen proposed a constructivist shell to guide the design and development of an interactive multimedia program. Criteria include use of authentic contexts and authentic activities, access to expert performances and modeling of processes, multiple roles and perspectives, collaborative events, opportunities for articulation and reflection, coaching and scaffolding, and authentic assessment. Cognitive information-processing or constructivist ID characteristics that fit this model include orientation activities, advance organizers, metacognitive devices, and active engagement, which Atkins described as follows. Orientation Activities Orienting activities prior to a learning task help learners to focus on new information, cut down the time needed to process information, and improve learning efficiency. Text, aural or visual cueing aim to hold new information longer in short-term memory for active engagement. Advance Organizers Advance organizers or anchoring concepts are introduced at the start of material to help learners make sense of information that follows. According to Ausubel , however, the pedagogic value of advance organizers depends in part upon how well material is organized. Advance organizers probably facilitate incorporation and longevity of verbal material in two ways. Second, appropriate advance organizers provide optimal anchorage, which promotes initial incorporation of new material and its later resistance to obliteration. If appropriately relevant concepts are not present, learners use whatever concepts are available. Metacognitive Devices Metacognitive devices such as advice statements, help facilities, suggestions for more

effective engagement and processing of information are employed. Providing a metacognitive framework is not easy, however. Much depends on the ability of learners to use such features. Active Engagement Learners are expected to analyze, synthesize, summarize, describe, and solve problems. They are expected to build hypotheses, explanations, definitions, categories, rules, and so on, through study of examples and reflection on their own experiences. To help them, instruction uses frequent decision points and direct involvement in games, microworlds, and simulations with results of decisions seen immediately. A variety of information sources are available to learners, who are moved back and forth between symbolic representations of phenomena and the real-life referent. Students also interact with experts Atkins, According to Winn and Snyder , decisions regarding learning strategies should occur during instruction, not ahead of time. Learning and ID are best achieved by developing learning environments whose function is not entirely prescribed, but which can adapt in real time to student needs. The latest interactive multimedia systems and virtual reality environments allow students freedom to learn in their own way, rather than in the way a designer prescribes. Rodriques cautioned, however, that making software nonlinear by building in hyperlinks for learner control does not make software constructivist, though it may make it less behaviorist. Users can still navigate without reflective thought. The problem in determining the effectiveness of cognitive design characteristics lies in the difficulty of knowing what is going on in the mind of learners. Evaluators are, therefore, forced back on measures such as apparent time on task, apparent engagement with the task presented, and subject estimations of its effectiveness Atkins, Hannafin, Hill, and Land , Litchfield , Milheim and Martin , and Orr, Golas, and Yao have addressed difficulties and solutions associated with providing learner control. Mental Activity The view of mental activities as actions, as opposed to their being considered indications of the presence of a consciousness or mind as a separate entity, are central differences between behavioral and cognitive orientations. Cognitive psychology is associated with mind; behaviorism is associated with body. Cognitive notions include schema, knowledge structures, and duplex memory, for example, and are structured ways to investigate consciousness. There are no behavioral equivalents. Differences are reflected in ID Burton et al. Structuring From the behaviorist perspective, instruction is made explicit with tasks and subtasks broken up into lessons and modules. From the cognitive perspective, structuring means supplying a framework around a task in which learners develop and test their own understanding. Learners may have to find relevant information for themselves from sources provided. This complexity requires more reflective thought Atkins, Behaviorists would identify explicit learning objectives; cognitivists would use advance organizers. Advance organizers stimulate higher-level learning Hannafin et al. Tutoring and Assessment For behaviorists, tutoring is focused on testing, analyzing performance, and providing remediation or extension of instruction. Assessment or tests of some kind e. For cognitivists, tutoring involves coaching and scaffolding at appropriate times. Assessment becomes integrated, authentic, and inseparable from activities themselves Atkins, Motivation Behaviorists value success as motivating and place more importance on extrinsic rewards, goal setting, and goal achievement, rather than on intrinsic rewards.

Chapter 3 : An Investigation of Behaviorist and Cognitive Approaches to Instructional Multimedia Design

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Chapter 4 : Peter Fenrich (Author of Creating Instructional Multimedia Solutions)

Fenrich, P. (). Creating instructional multimedia solutions: Practical guidelines for the real world. Santa Rosa, CA: Informing Science Press.

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Chapter 5 : Fenrich, P. (). Creating instructional multimedia soluti by Kamile Shed on Prezi

Practical Guidelines for Creating Instructional Multimedia Applications (The Dryden Press Series in Information Systems) by Fenrich, Peter. Course Technology Inc,