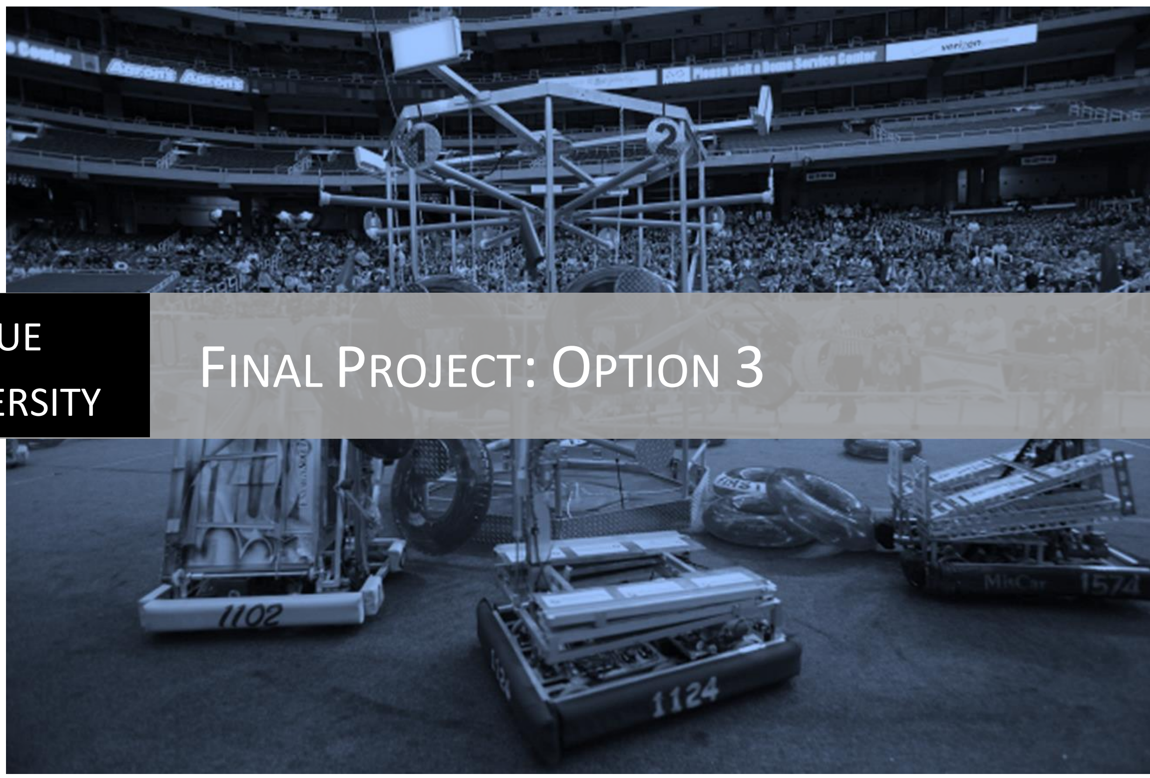
3/2/2014



PURDUE UNIVERSITY

FINAL PROJECT: OPTION 3

EDCI 531: Dr. Sunnie Lee Watson | Prepared by: Ellen Twomey

Introduction

Jen, the Robotics' team moderator, is entering her second robotics season where she is intent on ensuring the positive development of a team that struggled to foster a nurturing learning environment for newcomers to the team. The Robotics' league's six week deadline for completion (and shipping) of a robot creates a pressure point that means new team members are not always included in critical robot activities, such as building the electronics board, designing and welding the chassis, and assembling the appendage. In an effort to support the challenging entry for newcomers into this environment, Jen has implemented a pre-season learning session for newcomers only. The development of this session is described below including instructional materials listed in the appendices.

Part I: Cognitive Information Processing (CIP) & Schema Theory/Meaningful Reception Learning (*see Appendix I*)

In order to direct the team member's "selective attention" which "refers to the learner's ability to select and process certain information while simultaneously ignoring other information" (Driscoll, 2005, p. 79), the "introduction to robotics" handout is presented. The complexity of the task the learner is attempting significantly impacts the learner's attention (p. 79). The handout simplifies the concept of robotics and focuses the team member's attention on those aspects of robotics that are most essential for a beginner to understand. The graphics and colorful text of the handout draw attention to the sensory memory with vivid visuals and "chunking" (p. 87) is utilized to support working memory. Jen presents the handout to the team members, asks them to name one area that they see, and then prompts them to describe the graphic. She then asks all to think of items that they know that might be included within that sub-system; a task that supports "encoding" which relates "incoming information to concepts and ideas already in memory" (p. 89). For example, a member might respond by naming the electronics sub-systems and noting that wires would be part of that sub-system. This activity supports working memory because "when you are actively thinking about ideas and are therefore conscious of them, they are in working memory" (p. 75). "Anything that is to be remembered for a long time must be transferred from short-term memory to long-term memory," (p. 75) where information can be retrieved later. This discussion, along with the activity presented in Appendix II, will help members work with information long enough for this transfer to occur. Schema Theory and Meaningful Reception Learning further influence this instruction as the instructional material "activates prior knowledge" (p. 137) and "manages cognitive load" (p. 136). The discussion promotes "thought-demanding activities which promote skillful use of mental models" (p. 111). Appendix I is used as an "advance organizer" to "bridge the gap between what the learner already knows and what he needs to know" (Ausubel et al., quoted in Driscoll, 2005, p. 138). For example, a learner may know that wires are part of electronics, but the instructional material provides the new information that electronics is a robotics' sub-system.

Part II: Situated Cognition & Biological Bases of Learning and Memory

As "knowledge accrues through the lived practices of the people in a society," (Driscoll, 2005, p. 158) Jen implements this pre-season session to bring newcomers into "full participation" (p. 166) within the robotics team. The goal of the meeting is to give newcomers a foundation of what robotics is as a field, exposure to the team mission, and an opportunity to create a personal seasonal goal. By establishing a personal goal with the guidance of the robotics' team mission, newcomers become invested in the community of practice and head toward full participation in the robotics team in an inbound trajectory (p. 168). As learners "possess some differentiation of cognitive function that is neurologically based," (p. 298) individual goals embrace the differentiated learning that will occur on the robotics team. Compelling evidence suggests that human brains are characterized by plasticity (p. 297) supporting the belief that anyone can be successful in the challenging area of robotics with the right exposure, support, and practice. The newcomer's "Introduction to Robotics" meeting supports this adaptive learning and provides an enriched environment to enhance cognitive development (p. 297).

Part III: Motivation and Gagné's Theory of Instruction (*see Appendix II*)

The motivational aspect lacking on the robotics team is working as a cohesive unit to promote a positive, professional environment. Keller and Gangé provide complementary support on this motivational goal, though generally they address two different areas of instructional design. Keller (1979) limits his model to an instructional problem of motivation rather than one of skill or ability. Gagné on the other hand addresses skill and ability (Driscoll, 2005, p. 359). Gagné's "gaining attention" (p. 372) aligns with Keller's "gaining and sustaining attention" (p. 334) and as "gaining attention is accomplished by some sort of stimulus change," (p. 372) Appendix II contains waving text on the introductory slide to garner the learners' attention. The slide also includes a reference to the world "YOU" in order to support sustained attention and relevance (Keller, 1987). The second slide of Appendix II supports in "informing the learner of the objective" (p. 373) by dividing the goals of the session into three very specific ideas and providing an overview of the session. A review of the robotics team mission is provided in support of "stimulating recall of prior learning" (p. 373) as any introduction or promotional material of the team contains the mission statement. This is an important component to include, as the learners will be asked to create goals in support of this mission so this prior relevant information must be quickly retrieved as the members are faced with a new learning task (p.

374). Team members are made aware of the pending “build individual goals” activities on the “more on mission” slide which supports the event of “presenting the content” in that it is “prominently displays” this most essential “concept… to be learned” (p. 375). The “collaboration” slide reassures team members and lays the foundation for “learning guidance” (p. 375). Further “learning guidance” (p. 375) is presented in conjunction with “presenting content” (p. 373) in the “Robotics” and “field of robotics” slides as the concept of robotics is described “with distinctive features” (p. 373) noted and in a manner that provides “meaningful organization” (p. 373). The “Build your goal” slide walks the team member through the process of individual goal setting in support of the instructional event “eliciting performance” (p. 376). The performance elicited is the team member putting their ideas in writing. One-on-one sessions are held by Jen with each team member supporting the “providing feedback” (p. 376) instructional event during the review period which is conducted at the “Robotics is Fun” slide. The review allows the opportunity for Jen to assess performance of the personal goal statement the new team members have developed. Confidence building is present with “clear instructional goals” (p. 339) in the step by step process. Additionally, confidence building is supported as learners set their own goals (p. 339) as this activity is a goal setting exercise. The goal setting action item and subsequent review by Jen provides “natural consequences by providing learners with opportunities to use newly acquired skills” (p. 339) supporting the final stage of Keller’s ARCS model - satisfaction. Simultaneously, this activity support the final instructional event, transfer, as it is the beginning step in providing “varied practice and spaced reviews” (p. 373). Jen will use the goal set this session as the starting point for all one-on-one sessions held throughout the robotics season (one every two weeks). The goals will be reflected upon and feedback from Jen will help guide the team members on attaining these goals.

Conclusion

Instructional material can be influenced by multiple learning theories. By emphasizing different elements of a particular learning theory, maximum impact can be achieved. CIP offers insights into achieving permanent stores in memory. Schema Theory focuses on monitoring the cognitive load and tying new information to information that is already stored in our long-term memory. These two theories pair nicely to support the learning theory of the “introduction to robotics” handout. The Situated Cognition Theory and Biological bases of learning provide the guidance for the goal setting activity directed by the “Introduction to Robotics for YOU” presentation. The activity allows the members to become a part of the team in a comfortable setting with a task that manageable and supported. The plastic nature of the brain supports learning the complex topic of robotics by mandatory participation yielding team members to gain experience in robotics regardless of prior knowledge. Gangé’s Theory of instruction provides detailed guidance direction for the creation and execution of the “Introduction to Robotics for YOU” presentation. Keller’s ARCS model is a nice complement Gangé’s Theory in that is emphasizes certain elements to attain maximum motivation. These previously described theories influence the instruction of the newcomers’ pre-season session to positively impact the goal of creating a nurturing learning environment for newcomers to the team.

References

Driscoll, M.P. (2005). *Psychology of Learning for Instruction (3rd ed.)*. Boston, MA: Pearson.

Keller, J.M. (1979). Motivation and Instructional Design: A Theoretical Perspective. *Journal of Instructional Development*, 26-34.

Keller, J.M. (1987). Development and Use of the ARCS Model of Instructional Design. *Journal of Instructional Development*, *10, 3*, 1-10.

Appendix I (*see attached*)

"introduction to robotics" handout as file

" intro_robotics.pdf"

Appendix II (*see attached*)

"introduction to Robotics for YOU" presentation as file

"IntroToRobotics.ppt"