Olin College

SCOPE

Senior Capstone Program in Engineering

Autodesk

Olin SCOPE Team 2010-2011

Learning Like Gamers

Inspiring Self-Paced Learning in Professional Software

Project Overview

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Autodesk makes sophisticated 2D and 3D design software for use in the architecture, engineering, manufacturing and entertainment industries. Autodesk sponsored a SCOPE team to rethink the way self-paced learning could be integrated into their suite of professional software products. Working in collaboration with the Autodesk Education Group, the SCOPE team designed a novel new way to teach professional software.

Improving the learning experience for Autodesk users in a way that adapts to expertise, design context, and learning style would improve the overall experience of designing with Autodesk products. The gaming industry has elegantly solved these objectives, leveraging psychological principles to achieve implicit learning. Inspired by common gaming concepts, the team designed solutions for professional software that would motivate users to fully explore and learn the products on their own .

Research & Synthesis

The team synthesized research into a representation named the "Autodesk Learning Insight Deck." This deck, containing five “suits”, serves as both the tangible representation of the research findings and the rationale for the team’s specific concept ideas.

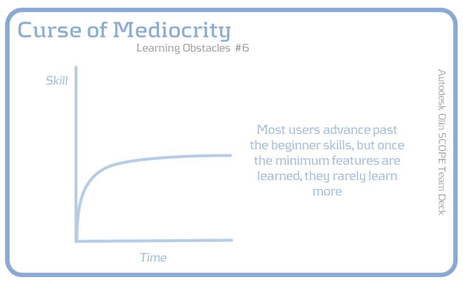
Learning Obstacles focuses on what it takes for people to maintain or lose interest,

Strategies for Instruction identifies which learning methods are useful in particular environments,

CAD Mental Models displays models for how students from various institutions think about CAD,

Personal Needs addresses fundamental emotional needs as identified by Anthony Robbins,

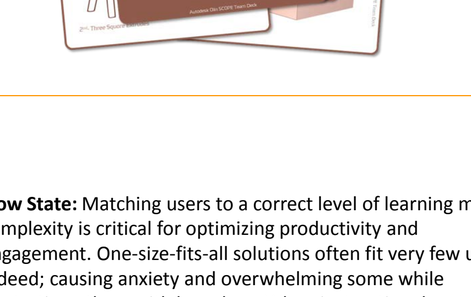
Game Attributes identifies methods in which games enable new players to become skilled extremely quickly.



Curse of Mediocrity: Skill learning over time often asymptotically approaches the minimum level required to achieve given tasks. The gains in efficiency that come from utilizing more advanced features aren't tangible enough to motivate users to climb their steep learning curve. Games make both incremental increases in skill level and their associated rewards explicit to users. With the motivation necessary for users to explore unknown territory and seek out available learning resources, users are able to soar past the curve of mediocrity.

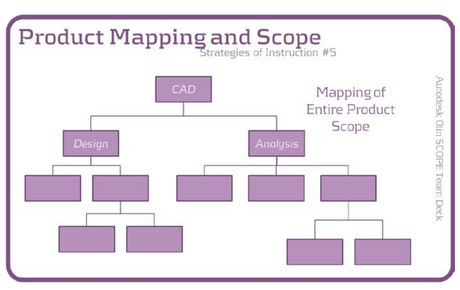
Research Highlights

Flow State: Matching users to a correct level of learning material complexity is critical for optimizing productivity and engagement. One-size-fits-all solutions often fit very few users indeed; causing anxiety and overwhelming some while frustrating others with boredom. When instructional material is well matched to a user's skill level, they feel confident in their abilities and proud of the challenges they can overcome.



Doable Challenge: People love to be challenged, but dislike failing. However, the right kinds of failures make them learn and improve. Each hard-earned success, in turn, increases their confidence. Handing players the perfect balance of the right kinds of successes and failures defines a doable challenge, and is a defining characteristic of the most widely popular video games in the industry. This means that users are never driven to frustration by the failures, bored or overconfident because of the successes, but instead learn from failures and strengthens their learning and confidence from their successes. This is a major basis of the learning systems developed from, or as a part of games.

Product Mapping and Scope: Users’ software skills often build off of one another, but the relationships between different skills may be obscure or known only to advanced users. If the software’s features are mapped, users would know what all the software tools are. Creating a hierarchical mapping could help users to see the relationships between different features and discover new, relevant features.



Game Mechanics

The team was inspired by games as a pedagogical phenomenon: many players invest significant amounts of time, effort, and money into honing their skills at creatively solving challenging, yet artificially-constructed problems. Well-designed games keep the player entertained while encouraging skill growth, helping them to develop expertise around their interests. The team investigated the most effective way to integrate game mechanics into the existing professional ecosystem, respecting the needs of all involved stakeholders.

Game Case Studies

In a *scaffold learning* environment, a game begins with very basic principles, and then presents additional complexity and raises the bar over time. The player is expected to have carried over the skill and knowledge from their previous experience while acquiring more expertise at the same rate. Scaffolding supports players when necessary and pushes them to avoid stagnation in their learning.

Plants versus Zombies: Learning Scaffold spectrum, showing early level that is impossible to lose on top along with a less-constrained and more complex final stage.

Starcraft II: Fog of War concept. An unknown attacking force is represented as red exclamation points on the map.

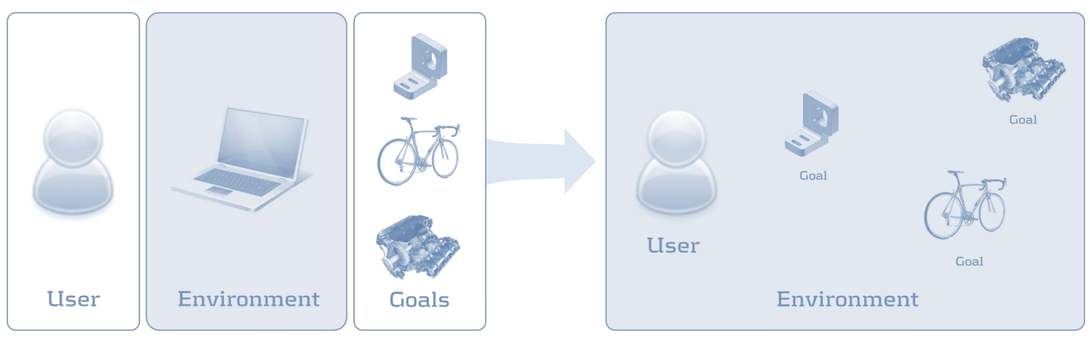
The *fog of war* concept prevents a player from seeing most of game map. The fog is cleared away as player controlled units approach the unexplored areas, encouraging players to move out of their position and explore their environment. The fog concept gives the players a good sense of where they are in the world, where they have been, and what is yet to be explored. When a user is using professional software tools, there is little knowledge of these two concepts. Neither the user’s own progress and proficiency nor what is waiting to be explored is clear, and so, the user’s growth is stifled.

Skill trees are a hierarchically-ordered, graphical representation relating where the player currently stands to what they are capable of achieving within the game. The tree-based structure allows players to choose a branch of skill specialization. Depth within any given area is easily elucidated from this visual, and crossovers and relationships between skills are made clear.

World of Warcraft: Skill Tree. The first two columns show skills that have been completed, while the advanced abilities in the rightmost column indicate possible future paths for the player.

Game Learning Model

In the world of games, the separation between the user, environment, and goals has largely been removed. One of the most central ideas to games, and the reason games tend to be so engaging to players, is that there is a very strong relationship between the user, environment, and goals. In other words, the software environment is very rewarding of a user's personal needs, and it often helps them develop their interests further and create and attain goals that are both of their skill level and liking. In most existing software there is a division between a user’s needs and goals from the software’s functionality and environment.



Professional Software

Game Industry