Changing the World View of Mining Through Game Based Learning

Move Mining Concept Paper

The following concept was originated by Corban Atwood (11-year-old) and Jayce Atwood (8-year-old). Both are students at Wingate Elementary in Grand Junction Colorado. Their idea is being sponsored by their dad, Garrett Atwood, a 13 year mining professional.

Corban Atwood  970-314-7782  ghatwood@charter.net
Jayce Atwood  970-314-7782  ghatwood@charter.net
Garrett Atwood  970-683-0912  gatwood@bowieresources.com
Changing the World View of Mining Through Game Based Learning

Move Mining Concept Paper

To change how the world views mining, we need to prevent misconceptions from occurring by educating and inspiring our youngest audience. Elementary and middle school aged children should be taught about the realities and benefits of mining in a fun and engaging way.

Our concept includes leveraging an already widely popular video game called Minecraft to increase young students understanding of the necessity and benefits of mining. This same approach could be used to engage older students as well.

The concept includes developing a refined version of the Minecraft game that includes a bit more of the realities of mining such as exploration, more realistic geology, milling and refining, energy sourcing and environmental stewardship.

This adapted version of the game would then be used to facilitate a competition among groups of students. Students would be allowed to train with the mining program for several months prior to live competition at the SME annual meeting. The live competition would include several teams from around the country that would “play” the mine craft game for a specified duration (say 2-3 hours). At the end of allowed game time, the game would generate a score for each team’s performance based on criteria including exploration techniques, mining methods, total ore mined, downstream processing, profitability, civilization advancement and environmental stewardship.

Why Game Based Learning?

Game-based learning (GBL) has become a powerful learning tool in recent years, and not just for elementary and middle-schoolers. Colleges such as MIT, Northeastern, Michigan State, Purdue and UPenn have long been making GBL an integral part of their curriculum to foster the 21st-century skills necessary to fill the millions of STEM (science, technology, engineering and math) jobs available in upcoming years.
The students would be recognized by the SME and awards would be given to the top three teams and their schools.

**What is Mine Craft?**

Minecraft is a sandbox video game originally created by Swedish game designer Markus "Notch" Persson and later developed and published by Mojang. The creative and building aspects of Minecraft enable players to build constructions out of textured cubes in a 3D procedurally generated world. Other activities in the game include exploration, resource gathering, tool building, mining, crafting, and combat. Multiple gameplay modes are available, including survival mode where the player must acquire resources to build the world and maintain health. The PC version of the game is noted for its modding scene, where a dedicated community creates new gameplay mechanics, items, and assets for the game.

Minecraft received praise from critics upon release, and was nominated for and won various awards and accolades. As of June 2016, over 106 million copies have been sold across all platforms, with more than 40 million unique players each month, making it the best-selling PC game to date and the second best-selling video game of all time. At any given moment nearly 1 million people around the world are playing Minecraft. In September 2014, Microsoft announced a deal to buy Mojang and the Minecraft intellectual property for US$2.5 billion, with the acquisition being completed two months later.

**Current game has some limitations and we recommend a few changes:**

The “out of the box” Minecraft game isn’t quite realistic enough to educate the gamer about the realities of mining. It does, however, do a great job of illustrating the need to extract raw resources and refine them for survival and improvement of quality of life.

Ore is deposited in small amorphous pockets instead of large ore bodies. Coal is also found in small pockets as opposed to seams. The “out of the box” game includes a standard set of ores including: Coal, Gold, Emerald, Diamond, Lapis Lazuli and Redstone.
The ore can be smelted and the resulting metals can be crafted into various tools, machines and other objects.

The game would be better suited to educate students if some modifications were made. We would propose the following changes:

1) Ore deposited in more realistic orebodies and seams.
2) More traditional smelting and refining (higher score for further refined products).
3) Additional ores (Copper, Zinc, Bauxite, Molybdenum, Uranium, and others) with scarcity variance for different ore types (Diamonds harder to find than Copper for example but worth more points).
4) Energy Generation – Players will be able to construct power sources using coal, nuclear, geothermal, wind, solar, and others but the game will include intermittency, construction costs and score implications for environmental stewardship intended to illustrate the pros and cons of various energy sources. (Current game uses Redstone, a fictional power source).
5) The ability to drill to define and explore ore bodies prior to mining.
6) The ability to mass extract using machines. Current game shows all mining by hand (blasting is available).
7) The combat aspect of the game will not be allowed between teams but will be allowed for mythical creatures such as creepers (exploding creatures that will help to simulate random crisis within the game).

The PC version of the game does allow for modification and there are several groups that have become very adept at creating tailored modifications to the Minecraft game. As part of the path forward for this concept, modification experts would need to be engaged to tailor the experience we are after.

**How would the game be played?**

Teams can be as big as 10 students but only four controllers will be allowed and 1 four way split screen per team will be displayed. Most successful teams will likely be those that coordinate and specialize inner groupings to explore, mine, harvest, refine and build.

The game will automatically generate a world with various resources randomly deposited throughout the landscape.

Each team will start with a small inventory of refined materials (Iron Ingots, Copper Cathodes, etc.) from which they can choose to craft tools or machines (such as an exploration drill). Consider this starting inventory as startup capital.
Students will be given a limited amount of time (expecting 2-3 hours) to find, mine and refine resources to improve their avatars standard of living. The gaming contest will be dramatic and large scale. Picture an event center filled with student teams, parents and supporters with large central projection screens that show the progress of each competing team with real time score tracking.

Once the time is up, the performance of each team will be gauged by their final score based on a set of established scoring criteria.

This event will get traction. Simply ask any of your children or grandchildren if they know what Minecraft is and you’ll soon discover that there is an incredible level of existing enthusiasm for this game.

**How will the game be scored?**

Scoring will be done using a game compiled point system that will award points based on the following criteria:

1) Total ore mined.
2) Value of ore mined.
3) Level of refined material.
4) Number and extent of Structures and Machines built.
5) Reclamation activity and overall environmental impact
6) Health and safety of remaining avatars (avatars can perish during the game!)

**What is the point of this program?**
The students will learn the value of exploration.

The students will learn that environmental stewardship is an important aspect of mining.

The students will learn that not all ore mined has the same value or abundance.

The students will understand the importance of ore grades.

The students will learn the value of smelting and refining raw materials.

The students will understand some of the pros and cons of various energy sources.

Most important, this program will be fun and inspiring and will increase enthusiasm in a younger generation for our industry.

Next Steps:

Once this concept paper is chosen by the SME, the next steps will be to:

1) Seek appropriate approvals from Minecraft for the use and modification of their program (this game is already widely available and modifications are common and encouraged).

2) Engage a firm or group capable of modifying the existing Minecraft game to be more realistic and to include system driven scoring (Note: It isn’t required to modify the game, this would likely still be successful with the game as it is, just not as educational).

3) Initiate a campaign with schools across the nation to begin to form teams, train and prepare to compete with one another at a central event.

4) Organize the main event at an SME annual meeting, Las Vegas Mining Expo, or other mining conference.

5) Determine recognition for students and schools that participate.

Draft Budget:

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Game Modification</td>
<td>$40,000</td>
</tr>
<tr>
<td>Advertising</td>
<td>$40,000</td>
</tr>
<tr>
<td>Event Support</td>
<td>$40,000</td>
</tr>
<tr>
<td>Recognition Awards</td>
<td>$30,000</td>
</tr>
<tr>
<td>Legal Support</td>
<td>$10,000</td>
</tr>
<tr>
<td>Travel</td>
<td>$8,000</td>
</tr>
<tr>
<td>Other</td>
<td>$32,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$200,000</strong></td>
</tr>
</tbody>
</table>