

The Mushroom Experiment Post Mortem

Overview of the Lesson:

This lesson is intended to teach core statistical concepts to students in junior high or high school. In this lesson the students run an experiment, then build a histogram showing the results of the experiment. The students then run the experiment again and compare the results of the two experiments. Please see the complete lesson plan for a detailed walkthrough of the lesson.

Playtest Participants:

This lesson was playtested in the classroom with students in 9th and 10th grade. The majority of the students were male. The students had previously playtested the Tower Challenge MinecraftEdu lesson and so were familiar with how to play the game.

About how this Lesson was Administered:

There were three playtest observers present at the playtest session. These observers were logged into the MinecraftEdu world as teachers. This gave them the access to all of the teachers tools available in MinecraftEdu. Spectate mode was turned on for each of the observers, making them invisible to all other players in the world. These observers assisted with some of the tasks required of the teacher during this lesson. The playtest observers allowed the playtest administrator to give the statistics lecture and administer the playtest while walking around the room.

The observers handled a number of technical tasks during the lesson. They handled tasks such as turning on and off student building at the beginning and end of the two mushroom collecting sessions, and helping students with technical problems. The observers replaced the destroyed fencing to ensure that students could not warp back to the islands after each collecting session. The observers also handled giving the students blocks after the mushroom collecting sessions and placing ladders on the block stacks so students could reach the top of a stack. When students placed a block at an incorrect spot, the observers destroyed it and gave the student another block to place. In short they gave the test administrator the freedom to lecture and interact with the students without having to worry about any of the technical considerations of running a MinecraftEdu lesson. This contributed to how smoothly the lesson went

Because the playtest administrator did not have to deal with any of the technical considerations of the lesson, a large amount of material was covered in one 50 minute lesson. It is likely that one teacher dealing with a class full of students will have to cover fewer concepts in one class session. Management of the Mushroom Experiment MinecraftEdu world is needed during the lesson. For this reason it may be better to cover this lesson over two class periods.

Challenges, Difficulties, and Lessons Learned:

This is not an easy lesson to administer or receive. The pace of this lesson is quick and the demands on both the teacher and the students are high. The teacher has to keep on top of a lot of things and lecture at the same time. This lesson demands a lot of attention from the students. They have to listen to the teacher, navigate the lesson world, and apply what they are learning. They must switch between these things very quickly while the lesson is going on.

Despite the high load of the lesson, using MinecraftEdu to run an experiment and apply knowledge of statistical concepts can be an effective way to teach statistics to high school students. The students were engaged with the content and all the students participated

in the lesson. Lecturing while the students navigated the world was a good way to impart knowledge and have the students immediately process and apply that knowledge. At the beginning of this lesson the students could not recall ever having heard the words histogram, distribution, variance, or variability. By the end of the lesson the students were correctly using this vocabulary to describe what they had learned.

The mushroom gathering task seemed to be fun for most of the students. Mixing a fun task with a more serious task seems to be a good way to use Minecraft in the classroom. The experimentation islands are designed to be fun to run around and explore. There are tons of mushrooms hidden behind blocks and on top of hills. At the same time as they are running around collecting mushrooms, students are gathering data that they will then describe by building a histogram. The task has both a fun side and a serious side. The tasks seemed to balance each other out so that the students were engaged and had some freedom, but also knew they had a job to do.

The difference in the amount of time it took the students to build the first set of histograms compared to the second set of histograms was notable. The students built the second set of histograms more quickly and with fewer mistakes than the first set of histograms. It might make a good homework or extra credit assignment to have the students go out and find a set of data, then describe that set of data inside of MinecraftEdu by building a histogram.

The students talked to one another during the lesson and taught each other about the concepts that were confusing them. The fact that students communicated with one another during the lesson and taught each other about the concepts being learned is a strong argument for teaching with MinecraftEdu. The students want to know the concepts being taught because they want to participate with the lesson and be a part of what is going on inside the game world. The engagement that the students feel with the game generalizes to the lesson and seems to motivate them to pay attention to the concepts being taught.

A few technical issues arose during the lesson. There were a number of problems with students falling through world when they warped to their experimentation islands. It seems that with a large number of students, Minecraft can have problems loading the chunks of the world that the students are trying to warp to. This results in students being warped to an island that is not there, and they fall through the ground. The solution to this is to have the student reload the world. They come back in at the same place that they left from, and the world loads correctly. This is a bit of a problem in that it skews the data gathered from the test, but it is something that can be addressed in the lecture about variance and distribution.

If a student gets stuck or messes up on an island, it is difficult or impossible to help them. There are 25 islands, each with a single student on it. The teacher controls can be used to warp to a student, but the warping process can be disorienting. Because the lesson world is so large, it can be difficult to find your way back to the area with the histograms once you have warped away.

A few students had problems placing blocks in the wrong spot on the number line. Because student building is turned off for the histogram building part of this lesson, and the students are placing unbreakable (without a special in-game tool) obsidian blocks, if a student places a block in the wrong spot they cannot correct their mistake. The teacher must break the incorrectly placed obsidian block and either give the student a new one or place a block for the student.

Some of the students were placing mushrooms on top of the histogram blocks, or were 'throwing' them at one another using the drop feature of the game. This was a problem because the number of mushrooms collected in each student's inventory was what the experiment was looking at.

This lesson would not have worked if the students had not already had some familiarity with Minecraft. If the students did not understand how to navigate the world and use the game there would be no time to teach them and they would get left behind. If the students had not had at least one session to play around with Minecraft, it is likely that they would have had a harder time focusing on the tasks at hand.

MinecraftEdu affords teachers the ability to make worlds of their own. It is possible to conduct experiments and test hypotheses in a way that would be difficult or expensive in the real world. Because the worlds are digital, it is possible to duplicate one element many times so that each student can experience the exact same thing. That can be very helpful when needing to duplicate something like the experimentation islands 25 times.

