SAA Activity Submission Form

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Title of Activity: Atlatl Experimental Archaeology

Briefly describe the activity in such a way that another instructor can implement it:
This activity is an experiential exercise to practice experimental archaeology, derive a dataset, and apply quantitative data visualization and interpretation. Details regarding logistics, preparation, and implementation are provided in the document.

What are the intended educational outcomes of this activity—what does it enable students to do or to know?
Apply lecture/reading content on subsistence and experimental archaeology; Experiment with ancient subsistence technologies; Collect real world data to address a specific research question; Practice data visualization; Interpret quantitative data; Build collaboration and teamwork skills

What kinds of courses is this activity appropriate for?
X Lower-level undergraduate   X Upper-level undergraduate   X Graduate

For how many students is this activity designed? Groups of 20 or so to conduct the atlatl throwing at a time. Options for dividing up class of more students can be explored as described in the document.

How long does the activity typically take? 50 minutes or 75 minute class is preferable for each session of data collection. 30-45 minutes for discussion of data results and additional aspects of research design.

What (if any) additional materials are required? Measuring tapes, atlatls, spears, clipboards are optional

ATLATL EXPERIMENTAL ARCHAEOLOGY

Today, you will get first-hand experience using a subsistence technology, known as the atlatl or spear thrower. Everyone will get the chance to use the atlatl and will also participate in an archaeological experiment. Groups of two will work together to collect data to address this research question:

Do greater arm length or total height correlate to the achievement of greater distance when throwing an atlatl?

The results of this experiment will help us to model possible physical characteristics of successful atlatl hunters and better understanding the physical dynamics of atlatl throwing. Once we have collected the data, we will use it to derive results and make inferences related to this research question and possibly some that you provide below.

To conduct this experiment, follow these instructions:

1.   Each student will be given the opportunity to practice throwing the atlatl at least one time before any distances are recorded.

2.   Before throwing the atlatl for data collection (after practices), each student will measure their arm length and total height (with the help of their partner).

3.   ALL GROUPS will record this information on their data collection table (back of this sheet) corresponding to the throwers position number and name. Make sure to record in CENTIMETERS. Everyone will be practicing organized, consistent, and diligent archaeological recording principles.

4.   Students not throwing the atlatl should volunteer to read measurements out so that everyone can record measurements accurately and efficiently. These volunteers should cycle out as others finish conducting their trials.

5.   Each student in turn will conduct two trial throws with the atlatl. Both the first and second distances will be recorded by ALL GROUPS on their data collection sheet.

6.   Every group will also determine the accuracy of each thrower (averaging both trial throws) and mark on their data collection sheet whether the thrower demonstrated great, fair, or poor accuracy in attempting to hit the target.

While your group is participating in the experiment and collecting/recording data, discuss and construct another research question that can be addressed by the data you are being asked to collect. Write your group's research question below. If you want to consider a research question that would require additional datasets, make sure to note what other information we would need to collect.

Also, consider whether there are any flaws in the way data was collected in this experiment. Does your group foresee any issues with this dataset? Consider how we could improve upon this experiment based on your concerns. Describe your group's concerns and thoughts on improvements below.

DATA COLLECTION TABLE

Thrower # & Name	Arm Length (in cm)	Total Height (in cm)	First Trial Distance (in cm)	Second Trial Distance (in cm)	Accuracy (Great, Fair, or Poor)

*** INSTRUCTOR LOGISTICS:

This activity was carried out in a field near a campus building. Two throwing lanes were set up with 100m tape measures laid out along the distance of each lane (about 30-40 m in length) for easy measurement. Throwing lines were created with pin flags. Two atlatls and two spears were provided. Approximately 5m tape measures were provided for height and arm length measurements.

For the class size of 44 students, we divided this experiment over two class days. Groups of 22 students conducted this experiment each day (switching over the two days; the non-experimenting group conducted an activity inside the classroom with a colleague). With two throwing lanes, 22 students were able to conduct enough trials over a 50 minute class.

One of the points of this activity was for students to be able to organize themselves in conducting the experiment and so working on team-working skills. Some groups were better able to accomplish these tasks smoothly than others. Also, the fact that all students are collecting the same data should reinforce topics covered in class regarding the importance of redundancy in data collection in the case of loss, etc.

AFTER DATA COLLECTION:

1.   Compile the data collected by the students into an excel spreadsheet. I've provided a partial example from my class below. I entered the first and second trials and created an average in the middle column. "Coded accuracy" refers to the code developed to represent great as 3, fair as 2, and poor as 1 for the purposes of graph development.

Thrower	Arm Length (cm)	Total height (cm)	Average Distance	Accuracy (Great, Fair, Poor)	Coded Accuracy
1	70	173	1350	fair	2
2	70	178	1750	great	3
3	71	174	2168.5	great	3
4	76	177	1585	great	3
5	76.5	174	1978.5	fair	2
6	72	173.5	976	great	3
7	67	162	1158.5	fair	2
8	63	155	581	fair	2
9	73	185.5	2600	poor	1
10	85	190.5	2600	poor	1

11	68.5	168	1078	fair	2
12	68.5	168	1220	fair	2
13	55	156	1200	poor	1
14	68	167	1347.5	poor	1
15	72	170	1971.5	fair	2
16	70	183	3100	fair	2
17	64	165	1800	fair	2
18	76	177	1585	fair	2
19	75	190	1785	fair	2
20	74	170	1240	poor	1
21	71	176	2805	fair	2
22	68.5	169	600	poor	1

2.   Produce graphs in excel that address the research question. (My class was a quantitatively focused course per University requirements so I spent class time to work the students through creating these graphs in excel and discussing the results as a class.)

Arm Length and Average Distance

Total Height and Average Distance
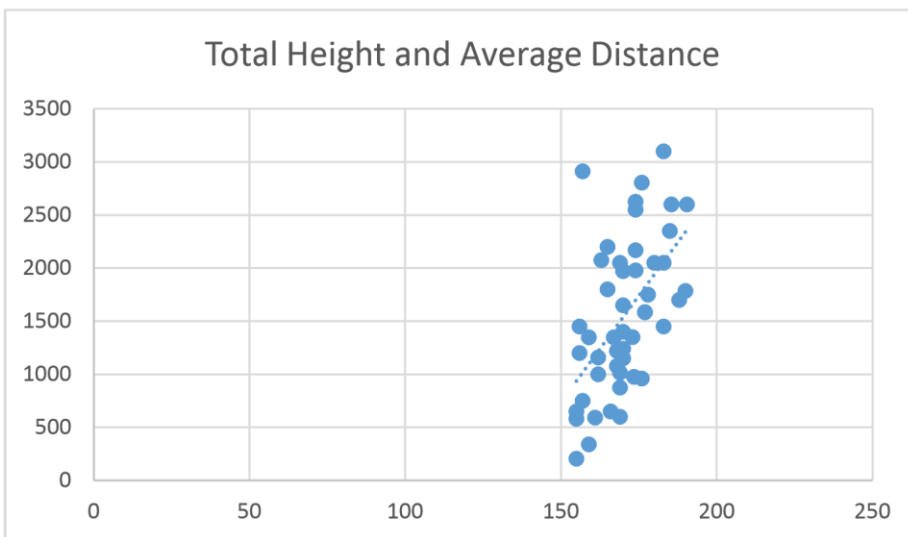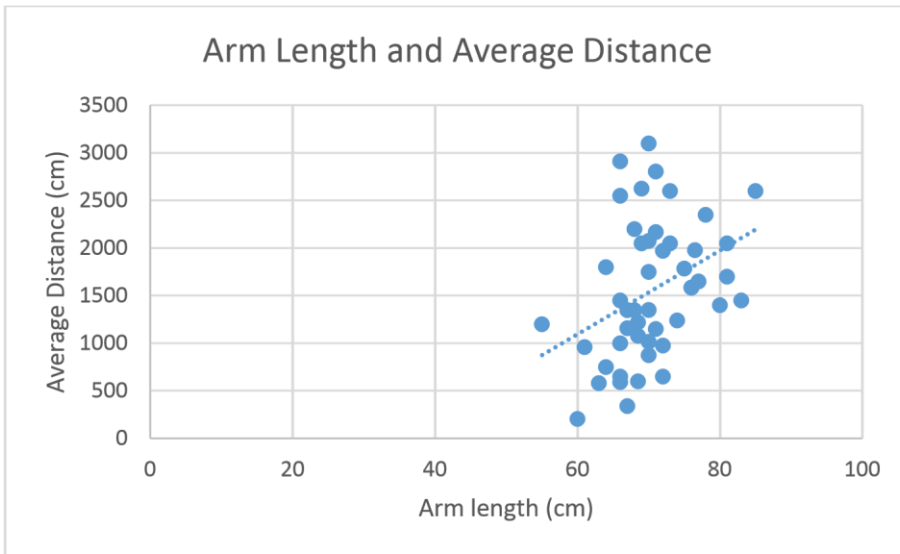
3.   Show graphs and ask students to discuss whether we can make any conclusions regarding the research questions. This is a good opportunity to discuss graph interpretation, fit lines, outliers, and data visualization in general.

4.   Introduce the concerns the students expressed about this experiment. Discuss their validity and significance. Discuss how you might modify the experiment to address these concerns. Examples developed by some of my students:
-    Subjective data measurements (everyone measuring their own throws),
-    No standardization (no policed starting line)
-    Environmental conditions can impact experiment (wind, sun in eyes)
-    Accuracy determinations were not consistent, some sort of formal target to measure from would have been better for accuracy

5.   Introduce some of the additional research questions that they proposed on their assignment sheet. Discuss research design and how you would conduct analysis. Example developed by some of my students: What is the relationship between average throwing distance and accuracy?