

Orienteering as a Tool to Teach Map Reading and Compass Skills

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Student Taking a Bearing

Abstract

As a way to enhance map reading and map making skills for introductory geology students, I created a laboratory in orienteering. Orienteering is a field-based sport that promotes problem-solving skills. The goals of this activity include increasing students understanding of how to navigate with a compass and map, interpreting landforms on a map and deciding the most effective route through an area. In this activity students were given a base map of the Kent State University Tuscarawas Campus, a compass and a GPS unit. The course created used eight orienteering course markers and punches. The course markers were hung on tree branches and man-made features along a linear path. The distance between markers varied. After a short description of pace and compass mapping, students were given a starting station marker and asked to plot the location of various markers onto their map by taking bearing and pacing distances. The location of the marker was then verified using a GPS unit. Students were required to navigate around buildings and vegetation. Time was recorded to make the activity more competitive but was not reflected in the student grade. Students evaluated the laboratory based on difficulty, enjoyment and projected utility of learning how to use a GPS unit, compass and map in the future. Strategies for creating an orienteering course and laboratory design are presented. With modifications based on age and ability, this orienteering activity can be used with K-16 students.



Students Taking a Bearing with a Compass

Activity 1 - Sighting Objects with a Compass

Activity 1 was designed to teach students how to obtain a bearing from a compass. Five stationary objects were chosen for students to locate near the Business Office on campus. Standing at a central point, students were asked to accurately determine the bearing. Students using their Silva compasses had to center the object in the sight, turn the dial of the compass and align the base plate red arrow with the north arrow. After this was accomplished, students had to record the reading from the index pointer. Overall the students quickly learned how to manipulate the compass dials and determine the orientation of objects in space.



Students Plotting Location on a Topographic Map

Materials, Tools and Logistics

Orienteering requires a base map, compasses and course markers. Finding a base map was the greatest challenge I encountered. I modified a base map of the campus from the 1960's. Most schools (or their architects) should have a topographic map of the region. The university had to invest in compasses for the students. I chose the purchase the nicer, more expensive compasses because of the clinometer. The Silva Ultra can be purchased at ~\$50 each. Silva makes less expensive brands of compass including the Guide and Polaris which cost ~\$10-\$15 each. Markers and punches were purchased through Ward's Geologic Supply. The flags cost \$4.25 each and the punches cost \$30 for a box of 10. The punches are not necessary unless a competition is being held. Markers can be made from everyday products, like milk cartons or boxes.

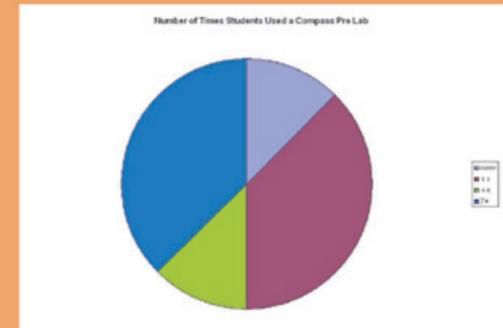
Logistically it is best to find a location that is wooded with topography. The best courses are designed with numerous possible ways to reach the markers. Then students have to choose between distances and topography. Transportation of students to the locality and traffic are always issues that need to be factored in if the course is away from campus.

Evaluation:

I had students complete pre and post lab evaluations. I wanted the students to leave lab feeling comfortable using a compass and locating objects on a topographic map. Below is a copy of the evaluation used:

Orienteering Name _____

- How many times have you used a compass?
Never 1-3 4-6 7+
- Do you feel comfortable using a compass?
Yes no
- Have you ever tried orienteering?
Yes no
- How comfortable do you feel plotting something on a map?
Not very somewhat able very able
- How comfortable do you feel measuring your pace?
Not very somewhat able very able
- Do you think reading a map and compass are important skills?
Yes no
- If the compass needle is pointing to 270° degrees which direction will you be pointed? _____
- If the compass needle is pointed to 25° degrees which direction will you be pointed? _____
- On three trials you measured your pace to be: 21, 25, 26 steps for 50 m. What would your pace be? _____
- What would you like to learn from this lab?



Some of the expectations that the students had from the lab included:

- " How to read a compass
- " Refresh orienteering
- " All about a compass
- " More orienteering skills
- " Compass use/direction
- " How to orienteer

Results of the Pre Lab Evaluations:

" Surprisingly, 18 students felt comfortable using a compass compared to the 6 who did not.

" Only 5 students of the 24 surveyed had tried orienteering.

" All of the students surveyed felt map reading and compass skills were important

Post Lab Evaluation:

- What did you expect to learn?
- Did you learn it?
- If not, why?
- What did you like most?
- What did you like least?
- What would you change?
- Would you recommend this lab to a friend?
- What would have made this lab better

Results of the Post Lab Evaluations:

" After lab 23 of the 24 students felt comfortable using a compass



Conclusion:

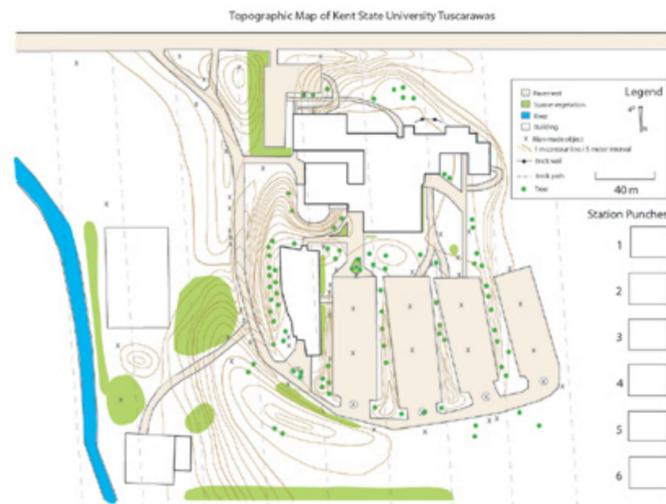
Students enjoyed this lab. All of the post lab comments were positive. Most students expected to learn how to use a compass and felt that they had mastered that skill by the end of lab. One student suggested this become a 2 lab activity with basic orienteering skills one week and then the next a longer more elaborate course the next. The students liked being outside and actively learning.



Student Punching Map

Activity 3 - Simple Orienteering Course

Around campus I placed six orienteering markers on tree branches. Tied to each marker was a red orienteering punch. On the punch was labeled the punch number and bearing of the next marker. Students were required walk along that bearing direction until they reached the next marker. Once at the marker, the students punched the according box on their map and plotted the location of that particular marker accordingly on their map. The course took students around the science building.



Aerial Photograph of Kent State University Tuscarawas



from: <http://mapper.acme.com>



Students Performing the 3 Legged Walk

Activity 2 - 3 Legged Walk

Activity 2 was designed to teach students how to walk along a bearing and close a loop. Each student was given a bottle cap. The bottle cap was placed anywhere on the ground. The students turned the dial of the compass to 40° and walk 25 steps in that direction. After 25 steps the students added 120° (to a bearing of 160°) and walked 25 steps in that direction. Then students were asked to add another 120° (to a bearing of 280°) and walk 25 steps. At this point the students should have ended up back at the starting bottle cap. In this activity students made an equilateral triangle. If the student did not end up at the bottle cap, he/she was asked to try again.

Learning Goals:

This activity was designed for students to apply map reading skills to the outdoors and integrate compass skills. The geologic skills used include map reading and compass handling. The higher order skills used include the determination of locations based on a topographic map and the surrounding man-made objects and landforms.

Context:

Orienteering can be used with students of any age group. Elementary school students would need a more basic shortened course. With practice in map reading and compass use high school and university aged students can compete on more complex courses.

The sport of orienteering utilizes a variety of different skills. Based on the time the instructor would like to dedicate and level of comprehension of the students a variety of different activities can be used. Many teachers may want to have younger students draw maps of the classroom and plot particular objects on those maps. Compass use can be introduced by sighting particular objects within the classroom. Once the class is ready to orienteer many types of courses can be set up indoors or outdoors. The simplest course (line orienteering) would be designed by drawing a line or using a string to delineate a course. Students would then follow the course and plot the location of markers onto a map. Another variation (point to point orienteering) for larger areas would be to have a base map with the location of several ordered markers drawn on it. Students then have to mark the location of the markers onto their own maps and locate those markers in the shortest period of time. One final variation (score orienteering) would be to put up many markers in a set area and have students find as many as possible in a set time period.

For this activity, I had already introduced basic topographic map reading skills with the students in the lab before. In this lab, I introduced how to use a compass and then integrated compass and map reading skills into the orienteering course.