

TEACHING AMERICAN HISTORY PROJECT

The American Turtle, 1776 by Maureen Festi and Jessica Cooley

Grade: 5

Length of class period: One 45 minute period

Inquiry: How did the inexperienced and newly formed American military use creative and innovative ideas as a means of trying to defeat the larger and more powerful British military?

Objectives:

As a result of this lesson students will be able to:

- Analyze a drawing of the first submarine invented by David Bushnell and predict how it worked.
- Compare the drawing with Sergeant Ezra Lee's account of operating the submarine in the New York Harbor in 1776.
- Evaluate the effectiveness and ineffectiveness of the invention.

Materials:

- Drawing of David Bushnell's 1776 *American Turtle* submarine:
<http://www.navy.mil/navydata/cno/n87/images/turtle300.jpg>
- Excerpts from Sergeant Ezra Lee's letter to David Humphrey:
http://www.history.navy.mil/library/online/sub_turtle.htm#item12
- Background information for teacher; <http://web.mit.edu/invent/iow/bushnell.html>

Activities:

- Pass out drawings of the *Turtle* to groups of students. Have them work together to predict what this invention does with an explanation of the function of the parts. Share the results with the class.
- Distribute copies of Sergeant Ezra Lee's Letter to David Humphrey. (The submarine was invented by David Bushnell from Connecticut, and due to the illness of his brother, was operated by a volunteer, Sergeant Lee.) After reading and discussing the letter, each student should label the parts on the drawing and compare it to their original prediction.
- Discuss the effectiveness of the submarine's attack on the British ships.
 1. How was this submarine supposed to help the Americans?
 2. What conditions were needed for a smooth operation of the sub?

3. How was the operator able to breathe?
4. How was the submarine powered?
5. What difficulties did the Lee encounter on his first voyage?
6. What do you think the British thought when the magazine exploded in the water? Do you think it made them nervous about what would happen next?
7. How do you think the British would have reacted if the operator successfully detonated the magazine on the hull of one of their ships?
8. What are some examples of other innovative ways that the Americans used their creativity to catch the British off-guard?

Assessment:

- Observations during discussions and activities.
- Labeled drawing of submarine
- Written assessment: Use evidence from the documents to support your written explanation to this question. Was David Bushnell's invention of the first submarine to attack a warship a success?

Connecticut Framework Performance Standards –

- explain the significance of the achievements of selected individual scientists and inventors from around the world and from various periods;
- initiate questions and hypotheses about historic events being studied;

12) Ezra Lee to David Humphreys

Lyme 20th Feby 1815.

Dr. Sir,

Judge Griswold, & Charles Griswold Esq. both informed me that you wished to have an account of a machine invented by David Bushnell of Say. Brook, at the commencement of our Revolutionary war. In the summer of 1776, he went to New York with it to try the *Asia* man of war:--his brother being acquainted with the working of the machine, was to try the first experiment with it, but having spent untill the middle of August, he gave out, in consequence of indisposition.--Mr. Bushnell then came to General Parsons (of Lyme) to get some one to go, and learn the ways & mystery of this new machine, and to make a trial of it...

Before I proceed further, I will endeavour to give you some idea of the construction of this machine, *turtle* or torpedo, as it has since been called.--(1) Its shape was most like a round clam, but longer, and set up on its square side--it was high enough to stand in or sit as you had occasion, with a (2) composition head hanging on hinges.--it had six glasses, inserted in the head, and made water tight, each the size of a half Dollar piece, to admit light...

The machine was steered by a rudder having a crooked tiller, which led in by your side, through a water joint.-- (3) then sitting on the seat, the navigator rows with one hand, & steers with the other--it had two oars... shaped like the arms of a windmill, which led also inside through water joints, in front of the person steering, and were worked by means of a wench (or crank) and with hard labour, the machine might be impelled at the rate of 3 nots an hour for a short time.

Seven hundred pounds of lead were fixed on the bottom for ballast, and two hundred weight of it was so contrived, as to let it go in case the pumps choaked, so that you could rise at the surface of the water.

It was sunk by letting in water by a spring near the bottom, by placing your foot against which, the water would rush in and when sinking take off your foot & it would cease to come in & you would sink no further, but if you had sunk too far, pump out water untill you got the necessary depth--these pumps forced the water out at the bottom, one being on each side of you as you rowed.

A pocket compass was fixed in the side, with a piece of light (4) wood on the north side, thus +, and another on the east side thus -, to steer by while under water—

Three round doors were cut in the head, (each 3 inches diameter) to let in fresh air,

untill you wished to sink, and then they were shut down & fastened--There was also a glass tube (5) 12 inches long and 1 inch diamater, with a cork in it, with a peice of light wood, fixed to it, and another peice at the bottom of the tube, to tell the depth of discent,--one inch rise of the cork in the tube gave about one fathom water.

It had a screw, that peirced through the top of the machine, with a water joint, which was so very sharp that it would enter wood, with very little force, and this was turned with a wench, or crank, and when entered fast in the bottom of the ship, ...From the screw now fixed on the bottom of the ship, a line--led to & fastened to the mazagine...inside the magazine was a clock machinery, which immediately sets a going after it is disengaged & a gun lock is fixed to strike fire to the powder, at the set time after the Clock should rundown--The clock might be set to go longer or shorter--20 or 30 minutes was the usual time, to let the navigator escape-- This magazine was shaped like an egg, & made of oak dug out in two peices, bound together with bands of iron, corked & paid over with tar so as to be perfectly tight, and the clock was bound so as not to run untill this magazine was unscrewed

I will now endeavour to give you a short account of my voyage in this machine.—

The first night after we got down to New York with it, that was favourable (for the time for a trial, must be, when it is slack water, & calm, as it is unmanagable in a swell or a strong tide) the British Fleet lay a little above Staten Island We set off from the City--the Whale boats towed me as nigh the ships, as they dared to go, and then cast me off--I soon found that it was too early in the tide, as it carried me down by the ships--I however hove about, and rowed for 5 glasses, by the ships' bells, before the tide slacked so that I, could get along side of the man of war, which lay above the transports.

The Moon was about 2 hours high, and the daylight about one--when I rowed under the stern of the ship, could see the men on deck, & hear them talk--I then shut down all the doors, sunk down, and came under the bottom of the ship, up with the screw against the bottom but found that it would not enter-- (6)

I pulled along to try another place, but deviated a little one side, and immediately rode with great velocity, and come above the surface 2 or 3 feet between the ship and the daylight--then sunk again like a porpoise I hove partly about to try again, but on further thought I gave out, knowing that as soon as it was light the ships boats would be rowing in all directions, and I thought the best generalship, was to retreat, as fast as I could as I had 4 miles to go, before passing Governor's Island.

So I jogg'd on as fast as I could, and my compass being then of no use to me, I was

obliged to rise up every few minutes to see that I sailed in the right direction, and for this purpose keeping the machine on the surface of the water, and the doors open--I was much afraid of getting aground on the island as the Tide of the flood set on the north point While on my passage up to the City, my course owing to the above circumstances, was very crooked & zig zag, and the enemy's attention was drawn towards me, from Governors Island.

When I was abreast of the fort on the island 3 or 400 men got upon the parapet to observe me,--at length a number came down to the shore, shoved off a 12 oar'd barge, with 5 or 6 sitters, and pulled for me--I eyed them, and when they had got within 50 or 60 yards of me, I let loose the magazine, in hopes, that if they should take me, they would likewise pick up the magazine, and then we should all be blown up together, but as kind Providence would have it, they took fright, and returned to the island, to my infinite joy.

I then weathered the Island, and our people seeing me, came off with a whaleboat, and towed me in--The Magazine after getting a little past the Island, went off with a tremendous explosion, throwing up large bodies of water to an immense height.
(7)

Before we had another opportunity to try an experiment our army evacuated Newyork, and we retreated up the North River as far as fort Lee --A Frigate came up and anchored off Bloomingdale. I now made another attempt upon a new plan--my intention was to have gone under the ship's stern, and screwed on the magazine close to the water's edge, but I was discovered by the Watch and was obliged to abandon this scheme, then shutting my doors, I dove under her, but my cork in the tube, (by which I ascertained my depth) got obstructed, and deceived me, and I descended too deep & did not track the ship, and I then left her.

Soon after the Frigate came up the river, drove our Crane galley on shore, and sunk our Sloop, from which we escaped to the shore--

I am &c. E. Lee

For General David Humphreys--

(1) This machine was built of oak, in the strongest manner possible, corked and tarred, and though its sides were at least six inches thick, the writer of the forgoing, told me that the pressure of the water, against it, at the depth of two fathoms was so great, that it oozed quite through, as mercury will by means of the air pump. Mr. Bushnell's machine was no larger than just to admit one person to navigate:--its extreme length was not more than 7. feet.--When lying in the water, in its ordinary state without ballasts, its upper works did not rise more than 6 or 7 inches

out of water--

(2) This composition head, means of composition of Metals--something like bell metal, and was fixed on the top of the machine, and which afforded the only admission to the inside--

(3) The steering of this machine was done on the same principles, with ordinary vessels, but the rowing her through the water, was on a very different plan--These oars, were fixed on the end of a shaft like windmill arms, projected out, forward, and turned at right angles with the course of the machine, and upon the same principles that windmill arms are turned, by the wind these oars, when put in motion as the writer describes, draws the machine slowly after it--this moving power is small, and every attendant circumstance, must cooperate with it, to answer the purpose, calm waters & no current--

(4) This light wood is what we sometimes call fox fire, and is the dry wood that shines in the dark: --this was necessary as the points of the compass could not readily be seen without--

(5) The glass tube here mentioned, which was a sort of thermometer, to ascertain the depth of water the machine descended, is the only part that is without explanation--the writer of the forgoing, could not recollect the principles on which such an effect, was produced, nor the mechanical contrivance of it--He only knows that it was so contrived that the cork & light wood rose or fell in the tubes, by the ascent or descent of the machine--

(6) The reason why the screw would not enter, was that the ship's bottom being coppered it would have been difficult under any circumstances to have peirced through it--but on attempting to bore with the auger, the force necessary to be used in pressing against the ships bottom, caused the machine to rebound off this difficulty defeated the whole.--the screw could not enter the bottom, and of course the magazine could not be kept there in the mode desired--

(7) When the explosion took place, General Putnam was vastly pleased, and cried out in his piculiar way--"God's curse 'em, that'll do it for 'em." ¹

¹ These explanatory notes were apparently added by Humphreys.

Source: Yale University Library. A slightly modified version of the letter was published in *The Magazine of American History*, vol. 29 (January-June 1893).

http://www.history.navy.mil/library/online/sub_turtle.htm#item12