Navigating a Map Using Ozobot Technology

2018 Biggar Hedges Submission

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Description of the ICT and its functionality

Ozobot is a “Small Smart Robot” that is programmable through drawn lines and color codes, and OzoBlockly editor. This program allows you to create complex programs and supports hands on learning through robotics and programming. It is an innovative approach to teaching that incorporates and integrates subjects, such as, programming, math, social studies and science in classrooms. Primary students can start with Ozobot color codes to adjust their speed direction and timing. Whereas junior students can engage in more advanced coding and programming of the Ozobot with OzoCode color codes on a tablet with a free app, or with markers and paper. Intermediate and senior students can advance their skills with the incremental introduction of more advanced programming concepts. Ozobot supports computational thinking, stimulation, participation mapping skills, gaming and programming.

Link to Ozobot: https://ozobot.com/

How To: Use Your Ozobot Bit Part 1: https://www.youtube.com/watch?v=m5d4iXGbIGs&t=9s

Pedagogy

How the ICT supports the intended pedagogical goals/student tasks

The following teaching methods can be utilized when using Ozobot.

Instructional strategies: Learning goals and activities with the Ozobot allows students to demonstrate different ways of responding, presenting their learning which integrates different intelligences and builds on intrapersonal and interpersonal skills.

Assessment: Students interaction with the Ozobot offers opportunities for assessment for learning to gather information to inform instructions about prior knowledge and academic content. Through observations of the students programing creations the teacher can offer constructive feedback. Students work with the Ozobot can be used as evidence for assessment of learning, to evaluate the student's achievement of curriculum expectations.

Classroom management supports: Ozobot offers students different entry points and use of space in the learning experience that matches their ability, interest and strengths. Students’ engagement supports inclusionary practice and participation which subsequently reduces behaviours and supports classroom management.

Educational rational and relationship to 21st Century Competencies
Inspired by our own teaching experiences and observations during our practicums, we noticed many grade 3-4 students experiencing difficulties with understanding cardinal directions and orientation, identifying a need for effective visual aids to support this learning. We believe Ozobot can teach students how to navigate using cardinal directions, through interactive inquiry-based learning, by exploring how to navigate a map from one location to another through investigations. The technology supports 21st Century Competencies, such as problem solving, creativity, innovation, critical thinking, decision making, communication and collaboration. We argue that a key and innate advantage of Ozobot is that it captures students’ motivation; as a result, students ‘buy-in’ to the technology and are incentivized to learn. Ozobot engages students in their learning process, allowing them to be co-creators in and of their learning and offers them a chance to set personal goals suited to their developmental need and differing skills.

**Inclusivity/Equity/Diversity**

Based on our classroom experiences, the Ozobot appeals to students from K-8. We argue Ozobot is a very diversified tool and allows users of multiple skill levels to engage in varying ways. The Ozobot learning can be targeted towards a student’s level of coding and programming skill. Students who are in the early stages of developing coding and programming can engage in learning to code through a more simplified approach; for example, drawing lines on a paper for the Ozobot to follow the path. A more advanced skill level learner may be interested experimenting with the OzoBlockly coding language. The particular students who we foresee who may find this technology challenging are ELL learners, students with special needs (such as students with movement needs or colour blindness), students with reading comprehension and/or oral communication (Language) and spatial sense (Mathematics) IEPs, and students with accommodations.

UDL is intended to increase access to learning by reducing physical, cognitive, intellectual, and organizational barriers. Students challenges will be supported and accommodated at their level of development with the Ozobot and provided multiple ways to demonstrate their learning. Such accommodations will support inclusivity and diversity and integrate multiple ways of representation; multiple entry points, engagement, motivation to learn; and meet the movement impairments of students and diverse assessment needs of students.
Content

**Grade(s):** 3 and 4  
**Subjects:** Social Studies and Mathematics  

**Big Idea:** Conceptual understanding of cardinal and intermediate directions to navigate maps and grids so to move from one location to another. This Big Idea is drawn from the grade 3 and grade 4 Social Studies (B3.7) and Mathematics (Location and Movement) curriculum documents.

**Content knowledge**

From the aforementioned expectations, the learning goals and success criteria were formulated as follows:

**What students are expected to learn:** Students can locate and describe their movement from one place to another on a map using cardinal directions (N, S, E, W), students can:

- move from one location to another on a grid map using numbers and letters on a grid;
- find a compass rose and legend on a map; and
- use an Ozobot and Ozobot colour codes to navigate cardinal directions along a printed map.

**Technological Pedagogical Content Knowledge (TPACK):** TPACK is based on effective teaching with technology and representing concepts using technology, pedagogical techniques and the use of technologies in constructive ways to teach content, differentiation or easy to learn technology that addresses the problems that students face. For example: Ozobot is used to address challenges with spatial awareness, directions, visual representations, kinesthetic learning, which scaffolds new epistemologies and strengthen old ones.

**Integration (the TPACK section)**

**Detailed description of the example**

**Beginning**

*Hook, Find the chair!*

- Teacher asks for one volunteer to “Find the chair!” No further directions are given.

*Introduce N, S, E, W*

- Play song “North, South, East and West”: [www.youtube.com/watch?v=WIYADwJdl1M](http://www.youtube.com/watch?v=WIYADwJdl1M)
- Place North, South, East, West signs on each wall in the classroom, acting as an aid for directions.
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- Explain N, S, E, W, are directions used on a map.

*Find the chair... with directions*
- Teacher asks for a second volunteer student.
- Prompt: What information be more useful to find the chair?
- Provide second volunteer with explicit directions to chair based on cardinal directions.
- Show 3 examples of maps and highlight the compass rose.

*Introducing Ozobot*
- Ozobot video up to 00:45: [https://www.youtube.com/watch?v=m5d4iXGbIGs&t=9s](https://www.youtube.com/watch?v=m5d4iXGbIGs&t=9s)

*Middle*

*Action 1: Create a Cardinal Directions Card*
- Each group will be asked to take out their sheet, Ozobot markers and Ozobot to follow along and create their *Cardinal Directions Card* (see Appendix A).
- Each group member will be numbered off and asked to draw one line of the *Cardinal Directions Card*.
- The *Cardinal Directions Card* will act as an aid when moving their Ozobot
- *NOTE: N = black; S = red; E= green; W = red*

*Action 2: Navigate your Ozobot on the Mapping Activity Sheet*
- Students will use a printed *Mapping Activity Sheet* to navigate from one point on the map to another (see Appendix B).

*End*
- Digital assessment tool: Students will submit 1 video per group on Seesaw.
- Additional reflection questions in *Seesaw or Padlet*:
  1. How did you find the tool?
  2. How would you move NE, NW, SE, SW?

*Evidence of learning outcomes*

Students’ interaction with the Ozobot promote opportunities for *assessment for learning* to gather information and inform instructions about prior knowledge and academic content.

Through observations of students’ coding and programing, the teacher can offer constructive feedback to inform *assessment as learning*. Students work using the Ozobot can be used as *assessment of learning*, to evaluate the student's achievement of curriculum expectations.

In our lesson we used games, songs and online maps to stimulate students’ background
and content knowledge. We interacted with students in groups as they worked with Ozobots, to conference and gather conversations to provide descriptive feedback which was used as assessment as learning. We used Seesaw as a digital assessment tool for assessment of learning because of Seesaw’s flexibility to evaluate students’ achievement of the learning goals of the lesson to link back to the curriculum expectations.

Research-supported learning lens
Researchers credit technology as a primary method to empower students to take control of their own learning (Armstrong, 2014). Current theories in the learning sciences indicate that we cannot simply continue to use concrete manipulatives such as globes and atlases in our classrooms as models; rather we must employ interactive tools that provide students with the opportunity for immersive trial and error (Sardone, 2013). The Ozobot technology extends the Social Studies curriculum beyond a globe or printed map and offers an interactive tool enhancing map navigation beyond what can be learned by a map alone. When thinking of coding in the classroom, often computer coding is understood as a stand-alone subject, rather than “as a way of thinking that may enhance existing subject areas” (Gadanidis, Brodie, Minniti & Silver, 2017). Our approach to using Ozobot is integrated within the subject areas of Social Studies and Mathematics; students learn to code in tandem with learning how to navigate a map using cardinal directions. Computational work, such as a coding Ozobot activity, supports higher order thinking skills (Falloon, 2016). Wing (2006) posits, “Computational thinking is a fundamental skill for everyone, not just for computer scientists. To reading, writing, and arithmetic, we should add computational thinking to every child’s analytical ability” (p. 33). We believe Ozobot supports the development of students computational thinking as Ozobot is self-guided, led by student inquiry and fosters 21st Century Competencies.
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References


Appendix A

Cardinal Directions Card, 8.5” x 11”, designed by our team.
Appendix B

Mapping Activity Sheet, 8.5” x 14”, designed by our team.

**Legend**
- N black
- S red
- E green
- W blue

**Instructions:**
1. Locate what is on A2.
2. Place your Ozobot at the A2.
3. Locate what is on D8.
4. Using the Ozobot colour codes navigate from A2 to D8.

**Questions:**
1. What is on A2? ___________________________
2. Show how you would navigate from A2 to D8, using the Ozobot.
3. What is on D8? ___________________________