Active Learning in a Self- Contained Classroom Through the Integration of Drones

Manuel F. Negron

New Jersey City University

Most public schools have great diversity with student populations that have various needs such as various academic strengths and weaknesses, cognitive abilities, and different levels of maturity. Public schools in urban districts have large student populations which result in large classroom sizes. Students find themselves in a classroom with 25 to 35 other peers and one teacher. In order to provide a least restrictive environment for students whose academic needs cannot be met in a general education classroom, schools have identified “self-contained” classrooms that provide an alternative setting with enhanced academic support. These self-contained classrooms have a maximum of 15 students with one lead teacher who is certified in teaching students with disabilities and a classroom paraprofessional. If a student in the classroom has an Individualized Education Plan (IEP) that requires them to have a 1:1 aide, then an additional paraprofessional will also be in the classroom.

Self-contained classrooms have been found to provide a positive academic environment which also supports personal and social development. These classrooms are intended to help students who have special needs and are struggling in their various content areas.

In order to provide the enhanced academic support in self-contained classrooms, I would like to create a self-contained classroom pilot that uses educational technology to enhance the overall learning experience by integrating drones in the classroom to promote an active learning environment where students are more engaged with the course content that is being presented to them at that time. “Active learning is anything course-related that all students in a class session are called upon to do other than simply watching, listening and taking notes” (Felder & Brent, 2009).

Passaic City school district currently has self-contained classrooms in most of their schools, but does not have classes both in general and special education settings that integrate technology through the use of drones or robotics in order to promote active learning. Last month Passaic High School was awarded a grant for a Career Aeronautics Pathway. In partnership with Passaic County Technical Institute, students entering this pathway will have access to an updated Physics laboratory and through a partnership with a local college will graduate with an FAA Remote Pilot’s License. This program will prepare students to assemble, operate, and repair remote aircraft to include drones.

**Rationale**

This pilot will be designed for a self-contained middle school class to promote active learning through the integration of drones in the classroom to improve teaching and learning. The goal is for students to be authentically engaged in their content areas to demonstrate academic success, be declassified, and mainstreamed into the Career Aeronautics Pathway at Passaic High School which is a general education setting.

**Research**

While there has been little research conducted in saying that the integration of drones in a classroom results in higher test scores. It can be said that the integration of drones promotes student motivation and authentic engagement, which results in academic success by enhancing content areas lessons to improve teaching and learning. “Motivation is often construed to be the stimulus that incites students to complete a task-the reward, either intrinsic or extrinsic in nature. Motivations is generally considered to be that influence that inspires and encourages students to engage in and complete activities that result in meaningful learning” (Carnahan, Zieger, & Crowley, 2016).

**Policy Consideration**

Policy consideration for this pilot program will reflect the policy of Aberdeen School District #58 Policy No: 1055 on Drones – Unmanned Aircraft Systems

All drone operators shall be responsible for complying with all FAA safety guidelines andregulations (subject to change), which include, but are not limited to:

* Fly below 400 feet and remain clear of surrounding obstacles. Do not be careless or reckless with aircraft and do not fly an aircraft that weighs more than 55 lbs.
* Maintain visual line of sight with aircraft at all times and remain clear of and do not interfere with manned aircraft operations
* Do not fly within five (5) miles of an airport unless the airport and control tower have been notified in advance and do not fly above or near people or stadiums

**Classroom Policy.** Drone technology in a classroom setting must adhere to the following requirements:

* A clear connection between drone technology and the course curriculum must exist
* Only the teacher, or appropriately trained and licensed designee, shall be permitted to use/demonstrate drone technology on school grounds
* Student-owned drones are not permitted
* Drones must be equipped with blade guards and eye protection is required for the drone operator and audience

(Retrieved from http://www.aberdeen58.org/wp-content/uploads/2016/09/1055.pdf, 2017)

**State of the Field**

The use of drones is growing rapidly in the workplace in major companies such as Amazon. It has always been known that drones are used in the military and police operations, but drones have become increasingly popular with realtors, travel agents, construction companies, schools, and many other professionals. “Officials at the Federal Aviation Administration believe the use of drones will be one of the fastest growing sectors in the aviation industry over the next four years. According to the Insurance Journal, there may be as many as 7 million drones in use by 2020. Of these, 2.7 million will be in use by private companies. Two categories of drones are expected to emerge. High-end drones, with a variety of commercial applications, could be sold for around $40,000. Smaller, low-end drones could be available for as little as $2,500” (Retrieved https://www.protoexpress.com/blog/the-current-state-of-drones)

**Assessment of Effectiveness**

The assessment of the effectiveness of this pilot will use pre- and post-assessment data by using Star Reading & Math, a computer-adaptive assessment which identifies which skills and sub-skills students know and which skills they’re ready to work on next. We will also look at the district formative and summative assessment data results. The growth of the students social and emotional skills will also be taken into consideration. “The development and maintenance of supportive teacher–student relationships, effective classroom management, and successful social and emotional learning program implementation contribute to creating a classroom climate that is more conducive to learning and that promotes positive developmental outcomes among students (Jennings & Greenberg, 2009)

**Proposed Cost**

While the price of drones can vary depending on its use. I have chosen to start our pilot class with the integration of the Parrot AR Drone 2.0. Since this class will have the maximum class size of 15. I have chosen to provide the students with one drone per every three students. I have also selected some basic items that will also be needed to fully implement the integration of the drones in this class. Training that is needed for the teacher will require 10 hours of simulator, 16 hours of ground school and 16 hours of flight training for a total of 42 hours of training at Unmanned Vehicle University. The following is a proposed itemized budget for the initial set up of the pilot class.

* UAV Pilot training course - $3000
* Teacher Hourly Rate as per contract - $44.50 x 42 = $1869
* Five Parrot AR Drone 2.0 Power Edition - $299.99 x 5 = $1499.95
* 15 sets of Propellers for AR.Drone 2.0 - $11.99 x 15 = $179.85
* 10 High Quality Upgrade Lipo Battery 11.1V 2500mah 20C for Parrot AR.Drone 2.0 Quadcopter - $17.99 x 10 = $179.90
* Two Parrot - Tool Kit for AR.Drone 2.0 = $19.99 x 2 = $39.98
* Five Apple 32GB iPads - $329 each x 5 = $1645
* Five Apple iPad protective case by Griffin Survivor - $44.95 each x 5 = $224.75

Total Cost = $8638.43

References

Carnahan, C., Zieger, L., & Crowley, K. (2016). Drones in education let your students imagination soar. Arlington, VA: *International Society for Technology in Education.*

Drones – unmanned aircraft systems. (2016, October 19). Retrieved August 5, 2017, from http://www.aberdeen58.org/wp-content/uploads/2016/09/1055.pdf

Felder, R. M. & Brent, R. (2009). Active learning: An introduction. *ASQ Higher Education Brief,* 2(4)

Jennings, P. A., & Greenberg, M. T. (2009). The prosocial classroom: Teacher social and emotional competence in relation to student and classroom outcomes*. Review of educational research*, 79(1), 491-525.

Morita, E. (2016, December 22). The current state of drones. Retrieved August 5, 2017, from https://www.protoexpress.com/blog/the-current-state-of-drones/