

Technology Use Proposal

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My proposed technological device is unique in its nature and capabilities. It is not an example of a cross-over to education from other industries. It is not an adaptation of a professional product, designed for educational use, like some gaming simulations or online portfolios (Kim, 2/5/2015). It is not a dumbed down alternative of a commercial gadget, imposed by the video recording industry, like a flip camera (Kim, 2/5/2015). It is not one of many other products, simplified or stripped out of features, to make it capable to cross over from the professional or commercial market to education. On the contrary, this device was created as a result of a joint effort between the education and technology professionals with the students and learning in mind. It is a proud product of the Educational Technology field (Reiser, 2007). It is a Raspberry Pi.

Originally created in 2008 by the team of professors from University of Cambridge, UK and several computing industry professionals, Raspberry Pi's objective was to meet the growing demand for low-cost, high-performance computer education (Raspberry Pi Foundation, n.d.) and become current technology learning tool. Governed by Raspberry Pi Foundation, a UK registered charity organization, it has grown to become a truly global educational initiative, providing affordable teaching and learning opportunities, not only in the UK, but worldwide. Several years and versions later, a Raspberry Pi, a credit card sized mini-computer, is the third best-selling computing device, with over 12.5 million items sold (The MagPi Magazine, 2017).

The tremendous worldwide popularity of Raspberry Pi's is not a coincidence nor a result of the superficial marketing scheme. Its success lays in the winning combination of the purpose oriented and affordance minded design (Norman, 2013), multiplied by the ease and versatility of use and overall affordability. Born as an educational tool, Raspberry Pi presents the exceptionally advantageous technology for its size, portability, cost, programmability and

connectivity to other devices. It allows for applied and experiential learning. It combines a number of key elements vital for accelerating the adoption of technology in higher education (NMC Horizon Report, 2017).

The use of Raspberry Pi technology is greatly scalable to many disciplines, such as cybersecurity, robotics, animation, physical sciences and others. It can also be expanded beyond the classroom to a maker-space type of setting (NMC Horizon Report, 2017). Its power to provide the opportunity for tinkering without fear of breaking or doing harm is unparalleled. It has been advocated by a number of Computer Science faculty members from the University of North Carolina at Asheville for Raspberry Pi devices to be included in any computing curriculum (Bruce, Brock, & Reiser, 2015). With its focus on innovation and opportunities for collaboration and deep learning, Bergen Community College students will benefit from using a set of Raspberry Pi's in the introductory computer programming and networking courses.

In providing quality education, Bergen Community College stresses the importance of assessment in all areas and disciplines. The student learning is evaluated by measuring acquired knowledge, skills and competencies as outlined by specific courses and programs (Bergen Community College, n.d.). Continuous program review cycles and reevaluation of course assessment techniques are aligned with the college's educational guidelines and policies.

To assess student learning in Introduction to Networking class, a number of hands-on activities/assessments will be developed for students to complete. Students will be asked to complete the following: using various network topologies, they will connect several Raspberry Pi's into different networks; discuss and analyze the differences between the network types; add peripheral hardware (such as a printer) to the newly created network; experiment and troubleshoot using various network configurations. Students will have an opportunity to work in

teams and collaborate on network troubleshooting and configuration issues. Students will be able to demonstrate various levels of mastery while building and configuring Raspberry Pi's based networks. Course assessment activities will examine students' mastery levels in the building and configuring networks, their problem solving and critical thinking skills, by working in groups and collaborating.

Integrating Raspberry Pi devices into computing curriculum was found successful by the faculty members from Miami University and was recommended as beneficial to students and curriculum alike (Jamieson & Herdtner, 2015). Thus, incorporating Raspberry Pi devices into BCC programming curriculum will positively affect the learning outcomes of BCC computer programming courses. To evaluate student learning in Introduction to Programming class, a number of Python programming exercises will be developed for students to complete. Students will be asked to download the operating system and install in on a Raspberry Pi's SD card. In addition, they will solve a series of coding problems using Python programming language. Students will be assessed based on their level of mastery in installing and working with the Raspberry Pi operating system as well as writing, testing and executing Python programs. Extra learning activities will be offered to students willing to advance in practicing Raspberry Pi's additional capabilities.

Besides providing local learning opportunities within BCC introductory programming and computer networking courses, Raspberry Pi can serve a vehicle for connecting to a greater learning community under the umbrella of Raspberry Pi Foundation. Online learning communities provide 24/7 support, encourage collaboration and instill the pride of ownership (NMC Horizon Report, 2017). As a member of Raspberry Pi community, students will not only become receivers of available materials but also become equal contributors of the learning

resources. Under Creative Commons license and policy, instructors and students can use and adapt any material with attribution to Raspberry Pi Foundation. Additionally, faculty and students are able to modify the material as needed, but the modified versions must be distributed under the same Creative Commons license (Raspberry Pi Foundatio, n.d.) There is really no better way to learn than learning by doing and contributing back to the community.

In conclusion, the proposed use of Raspberry Pi technology in the introductory programming and computer networking curricula will be beneficial for both faculty and students at Bergen Community College. It will provide opportunities for discovery-based learning, team work and collaboration in a classroom and maker space laboratory setting as well as ability to participate in and contribute to the global educational community.

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