E-VIEW

The Journal of The British Columbia Technology Education Association

March 2016

In this edition…….

Shop class: All fun and games?

How to build your own vintage arcade game using Raspberry Pi

Applied Design, Skills and Technologies

FEEDBACK NEEDED!!

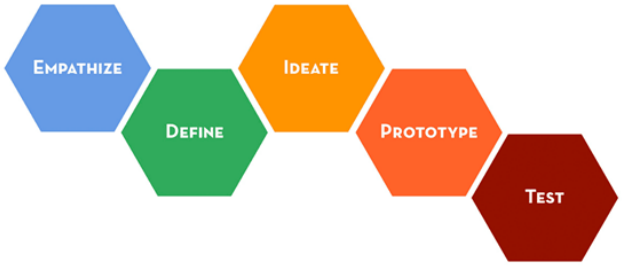
The BCTEA Executive is urging **ALL MEMBERS** to provide feedback of the new ADST K-9 curriculum by April 15th found at https://curriculum.gov.bc.ca/curriculum

Please email feedback to : curriculum@gov.bc.ca

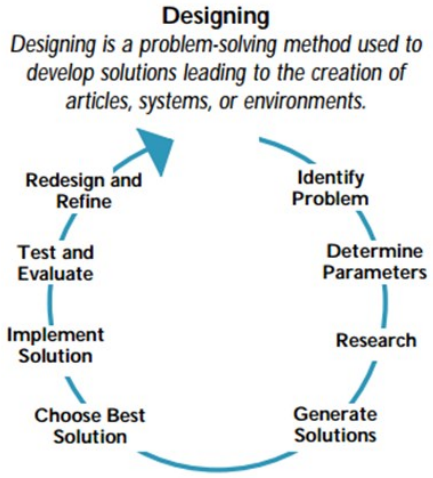
President's Message

Facebook seems to be a place for Tech Ed teachers to share ideas and projects, but it is also a good place to communicate with others in our teaching area. With the new BC curriculum created for K to 9 and the 10 to 12 being developed, we need to share our concerns.

Last week I presented a "Maker Day" on our Pro D day to 40 elementary school teachers in our district. I originally thought it would be a good idea to start preparing elementary teachers to deliver the new ADST curriculum. What it did for me, was to give me a better understanding of where the new curriculum organizers are coming from and to see why. I have made a bit of a shift in my thinking as a teacher from how I was trained back in the 90's. I went through the change from Industrial Education to Technology Education. Along with it we added new curriculum organizers, "Self and Society, Communications, Production, Control and Energy and Power". In these organizers there was a lot of emphasis on design. This is what design entailed then.



The image above is what design looks like now, at least according to Stanford's Design School. It is called Design thinking and it has one main change from the way I was taught about design and that is including "Empathy". This new design model is used not only in objects, but also in how companies operate. There is a lot of information on Design thinking, just google it. Here is a link to a short video that explains Design thinking https://youtu.be/a7sEoEvT8I8



Reflecting back on implanting the curriculum changes back in the 90's, which is what I did, and seeing where we are today, is going to give me guidance as to what kind of feedback to give to the new curriculum. I spent many years trying to implement the curriculum organizers listed above. After roughly 10 years of trying, I found that the curriculum started taking a back seat in my classes and it was more about how to engage students into working in a shop. When kids walked into any of my shops, they wanted to make things, bottom line. Spending too much time on the "airy fairy" stuff, turned them off. The same thing will most likely happen again in the secondary level unless students have to do it, such as in a mandatory academic subject. At the elementary grades it is easy to cover all the curriculum organizers because academic requirements can be wrapped around project work, but at the high school, with our discrete block rota-

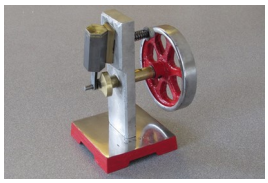
President's Message Con't

tions, we are not so lucky. Collectively we are going to provide input to the ministry, but after all is said and done for the new curriculum; it is going to be up to our membership to assist in keeping Technology Education alive and well. We will still need to share projects that we know kids like to make, we will continue to share techniques and processes that make teaching in large classes possible, and we will continue to excite kids to see the value of learning by doing.

I encourage everyone to get their LSA's working on these new directions, as a discussion topic. What should really be happening is this new Design Thinking, which permeates the new curriculum, should be how this new curriculum is created. What we seem to be seeing is several of the steps being omitted, such as prototype and testing, and others being glossed over, such as empathy, and ideate. It seems that the curriculum writing committee really has not had much time to go through this process, but are really being asked to just write curriculum, under very short timelines. Let's see if we can provide some feedback, find out who is actually testing some of the principles, and then finalize the curriculum.

By the time next year's conference comes along, we should be able to have some idea of what direction Technology Education is heading and have good discussions on what we collectively envision this new curriculum going.

By the way, the elementary teachers that attended the maker day workshop are very excited to get going with hands on learning, so let's make sure we connect with them and assist so kids can have a continuum of project based learning from very early years and through our courses at high school.

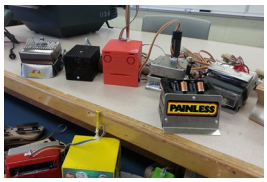


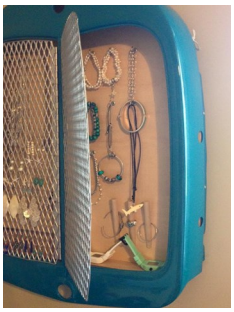
Facebook Page Update

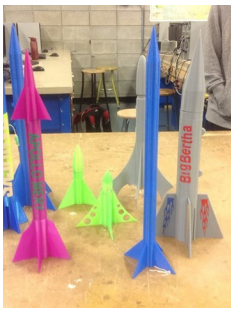
The BCTEA Facebook Group page has almost reached 150 members!! Only Shop teachers on the BCTEA Database can become members of the BCTEA Facebook group page. Great discussions and sharing of projects and ideas are taking place by the members of this group.

Please "JOIN" the group and get involved in the discussions and sharing @

https://www.facebook.com/groups/bctea







Category 5+ Through BCIT?

By: Devin D Burroughs

Since I started teaching I was often told that once I settle in I needed to get my master's degree in order to increase both my pay scale and my pension. Being a single father, the time commitment of a master's degree is a little farfetched. There is, however, an alternative to a master's degree called a Category 5+, which will also increase your pay scale and pension. Although the Cat 5+ does not pay the same as a master's degree the wage increase is significant.

SD67 Pay Scale	Cat 5	Cat 5+	Cat 6 Master's
Step 5 (6th year teaching)	$60,982	$65,379	$66,924
Step 6	$63,696	$68,272	$69,880
Step 7	$66,410	$71,166	$72,837
Step 10	$67,556	$76,788	$82,241

The chart above displays a typical pay scale chart in British Columbia. As you can see, the wage difference between a Cat 5 and Cat 5+ at your top pay rate is over $9,000 per year. The difference between a Cat 5+ and a Cat 6 is just over half that at roughly $5,400. A Cat 5+ program is estimated to be half the cost and half the time of a master's however the wage increase is proportionally higher compared to a master's.

Based on information provided to me by some post-secondary institutions, we can estimate that tuition should be roughly $10,000 over two years. If someone was to start a Category 5+ program in their 6th year of teaching they could start collecting their increased wage in their 8th year of teaching. The chart below shows the difference in wage between a Cat 5 and Cat 5+. The wage difference over three years is almost $15,000 gross. This means that you should be able to have your tuition paid off in three years and would be profiting beyond then.

SD67 Pay Scale	Cat 5	Cat 5+	Difference in wage
Step 7	$66,410	$71,166	$4,756
Step 8	$69,124	$74,060	$4,936
Step 9	$71,838	$76,952	$5,114
Step 10	$76,788	$82,241	$5,453

Now the question is what Cat 5+ program should you take? When talking with BCIT, they have shown interest in offering a program if they can find the students to fill the seats. Some ideas for course material included: Design for 3D Printing, Robotics Programming, Design and Build and CNC or 3D Printer. BCIT is quite willing to offer courses, and once they know there is a market they can design courses and a program to suit the needs of the market. This should be a grassroots initiative. If BCIT had 15-20 people who were interested, they could potentially influence the structure of the courses. Watch for an upcoming BCTEA list serve survey to show your interest and suggestions for the possibility of an upcoming program.

Shop Safety

By: Ryan Harmon

Tech-Ed teachers teach a wide variety of courses in facilities that can vary as much as their curriculum. However, the importance shop safety remains the same and fundamental to a successful program.

This article was inspired by various safety related "question / answer "posts found on the BCTEA Facebook page. If you have not already signed up, please check out:

https://www.facebook.com/groups/BCTEA/

In my opinion, safety in Tech-Ed can be viewed through two lenses; safety in regards workers, their employer and W.C.B. and safety in regards to maintaining a safe learning environment for our students. There is much overlap between these two entities so I will speak in general terms. **NOTE:** I am not a safety "guru" by any means, but feel free to use this article as a starting point assess your current classroom / shop situation. Also, feel free to refer to the Best Practices Guide and the "Heads up for Safety" manual:

http://www.bctea.org/best-practices-guide-document-0

https://www.bced.gov.bc.ca/irp/resdocs/headsup.pdf

Personally, I had the chance to teach and observe in many different shops and classrooms. These facilities have all varied in size, age, and function. I feel the most common safety issues revolve around cleanliness and organization. If there was ever an incident, accident or investigation in regards to safety, first impressions are the most critical. Just because you and your student's know where everything is in your chaotic shop doesn't make it a safe learning environment.

As a fellow "hoarder" and someone who is mindful of budgets and "good deals," I often end up with a bunch of random stuff that I might use one day. When storage of materials, tools and consumables get out of hand, ask yourself how bad do you really need that stuff? Piled lumber, electronic supplies, automotive equipment and metal can become falling and tripping hazards very quickly.

Storage of chemicals and supplies should also be neatly stored. Shop necessities include a flammable storage cabinet, fire extinguishers, and a sealed flammables garbage can. Anything that may cause harm should be kept locked away, and all materials should be in marked containers with MSDS sheets carefully organized nearby.

When working with power equipment, students should be able to prove their knowledge through careful instruction, demonstration and documentation. Tools should be in good working order

Shop Safety

with regular maintenance and inspection. Tools should also have factory guards installed, or added in the case where it may have been altered or removed. Magnetic switches on major equipment, and a main power kill buttons are also a must.

Personal protective gear must be easily found and in good working order. Have all of your safety glasses, masks, gloves, ear protection and dust masks kept in a common location so that students won't be hunting for equipment to keep them safe. It should all be in good working order and meet CSA standards.

Lastly, the things that are non-tangible may cause you the most harm. Tech-Ed facilities can expose its users and on-lookers to various chemicals, welding flash, dust, fumes and other unexpected hazards. Adequate ventilation, and shop layout

can help mitigate these issues. If your facility is poorly designed, old, or run-down, it may be difficult to structure your teaching and learning environment to work best for you and your students in regards to safety. I welcome fellow Tech-Ed teachers to ask one another for advice, and join the on-line community to offer suggestions, supports and ideas.

Shop Class Budgets

It would be simple and correct to say that material and equipment replacement budgets have shrunk over time in school districts. This is not really of much help to a new teacher. What new teachers need are some guidelines on what is needed in a shop class to effectively run a program in metalwork, woodwork, robotics, auto mechanics, etc. This article is intended to ask for some input from our BCTEA experienced members to share and help build budgeting resources for new Technology Education teachers.

Funding comes to districts from the Ministry of Education and goes into general revenue. It then needs to be divided up to serve all the needs of operating a school district, from maintenance to bussing, to staff salaries and everything in between. Shop teachers need to make sure that enough is put into their budgets so they can effectively teach hands-on courses. With the lack of materials and equipment a shop class quickly becomes un-interesting to students and they do not elect to take it. Plus the shop teacher quickly becomes disenfranchised and loses their enthusiasm along with the kids.

Over the years, I would not tend to lay blame to anyone in a school district for budgets shrinking, as administrators are hard pressed to provide equitably to all elective areas. As a shop teacher it is very important to show good value to administrators and students by the projects they make and the skills they learn. Having good examples on display is one way to always show what students can make, (don't leave 10 year old or older projects in the display cabinet, refresh regularly).

Budgets are going to vary widely from district to district and school to school. Each Technology Education teacher brings unique offerings to their courses, and thus require unique funding. I am thinking that the best way to probably lay out a table of budgets, is to break down roughly what is done in each shop class. We will start with overall budgets for a shop area, and then further break those down. If you are willing to share some of your numbers with me, I will collate and update the file that we can post on the BCTEA web site for new teachers to be able to go to school administrators for appropriate funding.

Teaching area	Budget	Materials Per block	Per student	Ave Equipment Replacement
Metalwork 8 - 12 (7 blocks)	$7,500	$1,100	$30	$1,500
Woodwork 8 - 12 (4 blocks)	$3,000	$750	$13	$1,000
Auto Mechanics 9 - 12 (4 blocks)	$2,100	$525	$16	$2,000
Electronics/Robotics 8 - 12 (4 blocks)	$2,000	$500	$10	$1,000
Drafting 10-12 (1 block)	$250	$250	$10	$1,500

The budget breakdown is mainly from G.P.Vanier Secondary School in Courtenay and was provided by Steve Claassen. The school has 1,050 students, grade 8 to 12.

Shop Class Budgets Con't

The table above is a very crude and rough estimate of what is a bare minimum budget. Our next steps will be to build in more details to each of the teaching areas. For example, teaching a senior metalworking student requires more resources than for a grade 9 student. Grade 8 students that are on an exploration rotation often cost lots due to the large number of students cycling through your shop. The next table is a rough idea of the information that I need from you. If you are willing to share and send me some details, I will compile. Once completed, it will be posted on the BCTEA web site for teachers to use in figuring out budget requirements. Of course there will be a spread of budgets from program to program, but your job will be to justify to your administration why you need what you are asking for.

Thanks in advance to those that are willing to share their budgets with the BCTEA.

Randy.Grey@sd71.bc.ca

Teaching Area & Grade	Project costs Per student	Consumable Costs Per class	Other expenses (please list)

University of Victoria

Are YOU *Red Seal* endorsed? Would you like to transition to a teaching career?

The University of Victoria's Faculty of Education now offers a Technology Education teaching area as part of its five-year secondary teacher education program.

UVic accepts applications from cabinetmakers, carpenters, electricians, joiners, machinists and metal fabricators who have Red Seal endorsement and five years of work experience.

Successful applicants are awarded two years of credit for the Red Seal and enter the secondary teacher education program in year three.

Students must complete three years of course work to qualify for the Bachelor of Education degree but there may be an option to begin teaching after year four.

Students attend years three and four on a full-time basis for eight months per year (from September to April). The final, fifth year may be taken on a part-time basis during May to August and/or September to April sessions.

For more information, visit the Faculty of Education's website at http://www.uvic.ca/education/prospective/teacher/programs/secbed/index.php.

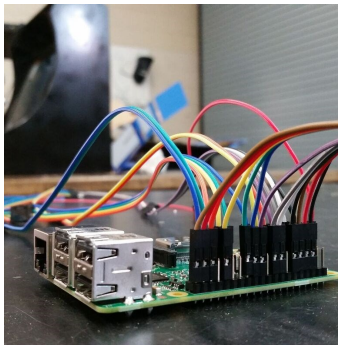
or email our Faculty of Education Advisers adve@uvic.ca

Raspberry Pi Bartop Arcade

This cross curricular project involves collaboration from many different subject areas. Woodwork and metalwork for the cabinetry, electronics for wiring and parts, and some computer programming with software understanding.

By: Michael Holbrook

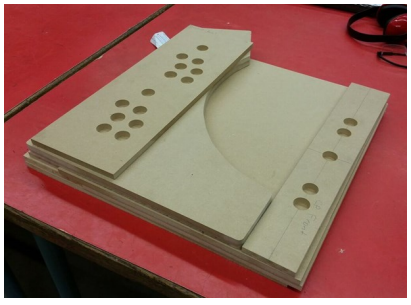
This arcade system runs completely from a Raspberry Pi 2. With some programming, wiring, and research this small computer can be used for endless projects.



We have used it to build a retro gaming system complete with professional grade arcade joysticks, buttons, and microswitches all wired to the GPIO headers on the RP2. And it has wifi!!

I found a cabinet design on Instructables that I modified based on my monitor and the way I wanted to wire everything. We used a 19" Dell 4:3 monitor from Craigslist since most retro games use a square ratio and I didn't want the want of a CRT. I used ½" MDF for the cabinet with ¾ blocks for mounting everything inside (see the videos and build photos on my instagram).

The first prototype felt too cramped and it was difficult to fit the components in without them breaking, which did happen! For my 2nd and 3rd builds I widened the cabinet designs by 2 inches to give me more room to play with. This made cable management much easier and gives a wider playing surface when playing with 2 players during co-op or fighting games.

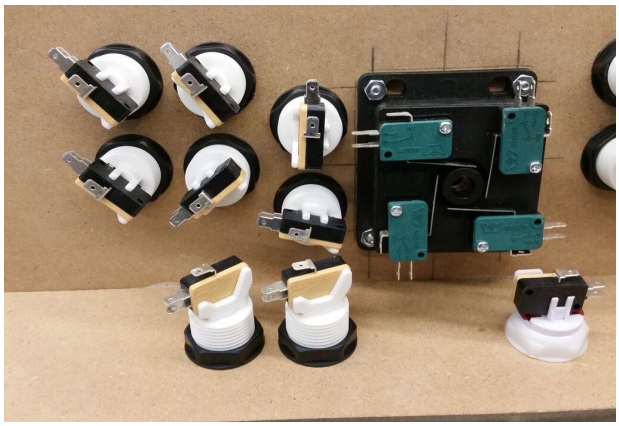


An arcade kit with buttons, joystick, and a keyboard encoder (didn't need this part) were ordered for around $100 on eBay. My design uses 19 buttons (8 for games, 2 for hotkeys, and a reset button). When the kit arrived I wasn't happy with the length of connecting wire it came with so I made my own using quick connects (for the micro switches), and dupont connection housings and female pin connector terminals (for the GPIO headers.

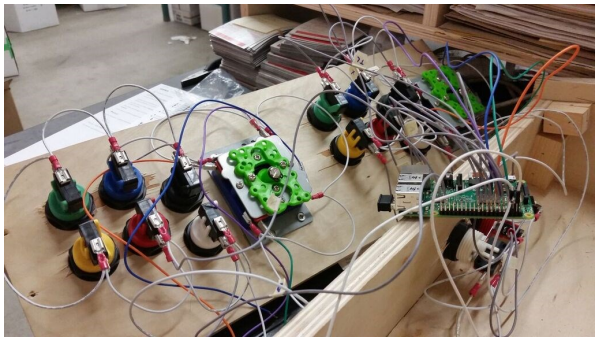
The control panel is easily taken apart for maintenance like replacing microswitches, fixing loose connections, and tightening buttons that sometimes come loose after hours and hours of play. The control panel uses #10x24 machine screws and T-Nuts to hold it in place. The holes are countersunk so the playing surface remains smooth. The rear access panel uses a hinge and camlock system for easy access to the back and so only I can get to it. The speakers are temporarily housed in the rear cavity. Eventually I will add proper power switches and a

Raspberry Pi Bartop Arcade
Con't

volume control to the outside so you don't have to open up the back to make changes.

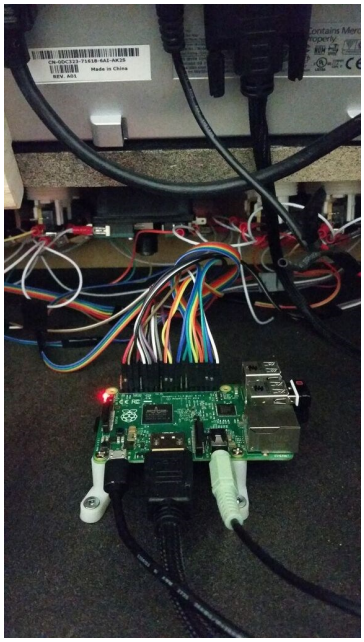


Adding Acrylic pieces in front of the screen and marquee area makes the colors look amazing compared to just the monitor. I used Acrylic because we had some laying around the shop but I would try plexiglass for future builds.



After formatting my micro SD card I loaded up files from https://github.com/recalbox/recalbox-os/releases and stuck it into the Raspberry Pi 2. I am using "recalboxOS v3.3.0-beta16" currently.

The front end is called Recalbox and is based on the GNU/Linux Operating System. I chose this system over Retropie because of its ease of installation and the ability to be up and running in under 30 minutes with minimal programing. Because I am using a monitor with a DVI input I had to edit some configuration files before anything would show up on screen. The Recalbox community is super helpful with troubleshooting and I solved all of the issues that I needed to get it running the way I want it. Programming can be done directly on the unit itself, via wifi, or by plugging the SD card in a computer that is able to read the volumes partitions correctly.



Eventually we will be adding a custom made marquee, proper speakers, and a vinyl wrap with custom artwork made by the students. Since the project is still in progress we can customize it further until we are satisfied!

These prototypes are meant to inspire students to explore 'vintage' ideas and create something new.

I would estimate the total cost of the project to be around $350 without artwork. Proper vinyl wraps and marquee printing would probably bring the cost to around $400. I would love to add arcade t-molding to a future build. I am able to build one from start to finish in under a week with students taking about half a semester. The longest time spent would be building a nice cabinet. Electronics can be put together in about 2 hours if you have to cut and crimp your own connections. I have made 3 arcades so far and all the units have seen hours and hours of gaming fun.

More photos and videos can be found on my instagram and you can find me on the BCTEA Group facebook page.
https://www.instagram.com/we_build_stuff/

Skills Compétences Canada
British Columbia

Skills Canada BC competitions are a great experience for students to demonstrate the skills they have learned through Tech Ed classes. Regional competitions have been taking place around the province to find the best of the best in BC. The 22nd Annual Provincial Competition will be held at the Abbotsford Tradex on April 13th, 2016. Winners will go on to the nationals in June 5-8, 2016 at the Moncton Coliseum in Moncton, NB

Recently, students in the Central Lower Mainland region travelled from as far away as Richmond to compete in the Cabinet Making competition at Westview Secondary in Maple Ridge. The event was hosted by Mr. Andy Strothotte, Westview Secondary's woodwork teacher. Everyone had a good time, and a lot of learning took place! For this year's project, a Sjoelbak (Dutch shuffleboard) game was built. The winner, a student from Westview is looking forward to competing in the Provincials in April. (photo submitted by: Ryan Harmon).