Application Note: 2

How Buzz-Boards Support Edexcel BTEC and GCSE Computer Science Courses

Buzz-Boxes are essentially platforms to provide applications for Industry and education standard computers such as Raspberry Pi's, mbeds and similar computers. As such, like any computer they support a broad range of computer science activities.

The following two tables contain verbatim copies of the BTEC and GCSE units/topics (listed vertically) and show where they are supported by the educational affordances of the Buzz-Boards (listed horizontally).

Edexcel BTEC Computer Science Courses

The Edexcel BTEC qualifications addresses here are

- Edexcel BTEC Level 2 Certificate in IT
- Edexcel BTEC Level 2 Extended Certificate in IT
- Edexcel BTEC Level 2 Diploma in IT

These courses are structured into a pallet of some 36 units (listed vertically) in the following table and mapped to appropriate Buzz-Box educational affordances (listed horizontally).

Buzz-Boards Educational Affordances / BTEC Units	Programming	Operating Systems	Hardware	System Architecture	Communications	Multimedia	HCI	Sensors & Actuators
Communicating in the IT Industry								
Working in the IT Industry								
Computer Systems	X	X	X	X	X	X	X	X
Business IT Skills								
Supporting Organisations with IT								
Project Planning with IT								
Installing Computer Hardware		X						
Installing Computer Software	X	X						
Customising Software	X	X					X	
Setting up an IT Network				X				
IT Security					x			
IT Support	X	X	X	X	X	X	X	X
IT Fault Diagnosis and Remedy	X	X	X	X	X	X	X	X
Mobile Communications Technology				X			X	
Mathematics for IT	X				X	X		
Database Systems								
Website Development							X	
Software Design	X	X						
Object oriented Programming	X							
Procedural Programming	X							
Event driven Programming	X							
Doing Business Online								
Computer Graphics						X		
Telecommunications Technology				X	X			
Home Entertainment Systems						X	X	
Developing Computer Games	X	X				X	X	
Spreadsheet Modelling								
Multimedia Design	X					X		
Presenting Information Using IT								
Animation Techniques	X					X		
Interactive Media Production								
Software Design and Development	X	X						
Database Design								
Website Production	X					X		
Digital Graphics								
Spreadsheet Modelling								

Edexcel GCSE Computer Science Courses

The following table maps Pearson Edexcel Level1/2 GCSE in Computer Science to Buzz-Board educational affordances. The academic content (paper-based - Unit code: 1CP0/01) is split into 6 topics which, together with a complementary set of lab based work (Practical programming - Unit codes: 1CP0/2A, 1CP0/2B, 1CP0/2C), are mapped to Buzz-Boards

Buzz-Booard Educational Affordances / Edexcel GCSE Topics	Programming	Operating Systems	Hardware	System Architecture	Communications	Multimedia	HCI	Sensors & Actuators
Principles of Computer Science								
Problem solving (Decomposition & Algorithms)	X			X				
Programming (Code, Constructs, Data, I/O, Operators, Subprograms)	X	X		X		X	X	X
Data (Binary, representation, Compression, Encryption, Databases)	X		X		X	X		X
Computers (Hardware, Logic, Software, Programming Languages)	X	X	X	X				
Communication & internet (Networks, Internet/WWW, Client-server)	X		X		X			X
The bigger picture (Impact, Legal & ethical)								
Practical Programming								
Decomposition (Modularisation)	X	X	X	X	X			
Algorithms (original and reuse)	X	X						X
Programming (design, write, test, explain and correct errors)	X	X		X				
Use of Python (unit code 1CP0/2A)	X							
Use of Java (unit code 1CP0/2B)	X							
Use of C-derived language (unit code 1CP0/2C)	X							

These topics are based on 'Draft 1' (June 2013) of the Pearson Edexcel Preliminary Specification for GCSE levels 1/2 GCSE in Computer Science. What is particularly relevant to Buzz-Boxes is that Edexcel describe the practical work as "*a 'making task' that enables students to demonstrate their computational techniques using a programming language*" (Python - unit code 1CP0/2A; Java - unit code 1CP0/2B; C-derived language - unit code 1CP0/2C). As Buzz-Boards utilise numerous industry and education standard computing platforms such as the Raspberry Pi and mbed etc, they run all these languages and can cover any of the computing principles that these education standard platforms can. In that respect the mapping provided in these tables is more of an exemplar, as the exact associations will occur when the teachers design the coursework.

Supplementary information:

- http://www.edexcel.com/quals/firsts10/it/Pages/default.aspx - Edexcel BTEC level 2 and 3 specification
- http://www.edexcel.com/quals/gcse/gcse-2013/computer-science/Pages/default.aspx - Edexcel GCSE specification
- http://victor.callaghan.info/publications/misc/BuzzSpaceFlyer(ver1).pdf - A *Buzz-Box* product flyer
- http://victor.callaghan.info/publications/2013_WOFIEE13%28PuttingTheBuzz%29.pdf - A paper discussing *Buzz-Boxes* in relation to the UK Governments' Education Secretary, Michael Gove's reforms for teaching Computer Science in Schools and the ACM / IEEEE Computer Science 2013 curricula proposals -
- http://victor.callaghan.info/publications/2013_IE13%28EducationalLivingLabs%29.pdf - A paper discussing method of introducing programmers to beginners using *programming-by-demonstration* and the *Harlow smart-box* approach