

# P L A Y P O W E R

*Building Innovative Computer-Aided Learning Games for Developing Regions Using Radically Affordable \$12 "TV-Computers"*

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## **Project Background:**

The world's most inexpensive home computers cost as little as US\$12 and can be found in street markets in countries like India, China, and Brazil. Like early computers in America, they use a TV as a display to save money. Despite their low cost, they are typically sold with a full keyboard, mouse, 2 game controllers, and a cartridge containing a handful of games and BASIC programming. These "TV-Computers" give new life to an 8-bit computer processor, the 6502, which was used both in the Apple II and the Nintendo Entertainment System. Promisingly, the Apple II was a highly successful platform for education in America, as it was present in over 50% of all public schools and gave rise to games like "Number Munchers," "Lemonade Stand," and "Oregon Trail."

Playpower is an UCSD project that seeks to use ultra-affordable (<\$20) computers as a platform for basic computer-aided learning (CAL) games. CAL games have been demonstrated to be an effective and rapidly scalable approach to improving public education in developing regions. Furthermore, even basic computer skills can be economically transformative: even learning to type can mean the difference between making \$1/day and \$1/hour. As an affordable platform for playing games and learning to program in BASIC, these TV-computers may have educational value in areas around the world. Considering the widespread availability and low cost of the 6502-based system, Playpower is seeking to produce a set of tools to facilitate new content development on what is arguably the worlds most inexpensive home computer.

## **Project Goals:**

This quarter, we are building a Development Cartridge and a Modem Cartridge to enhance access to this machine as a development environment.

## **Development Cartridge:**

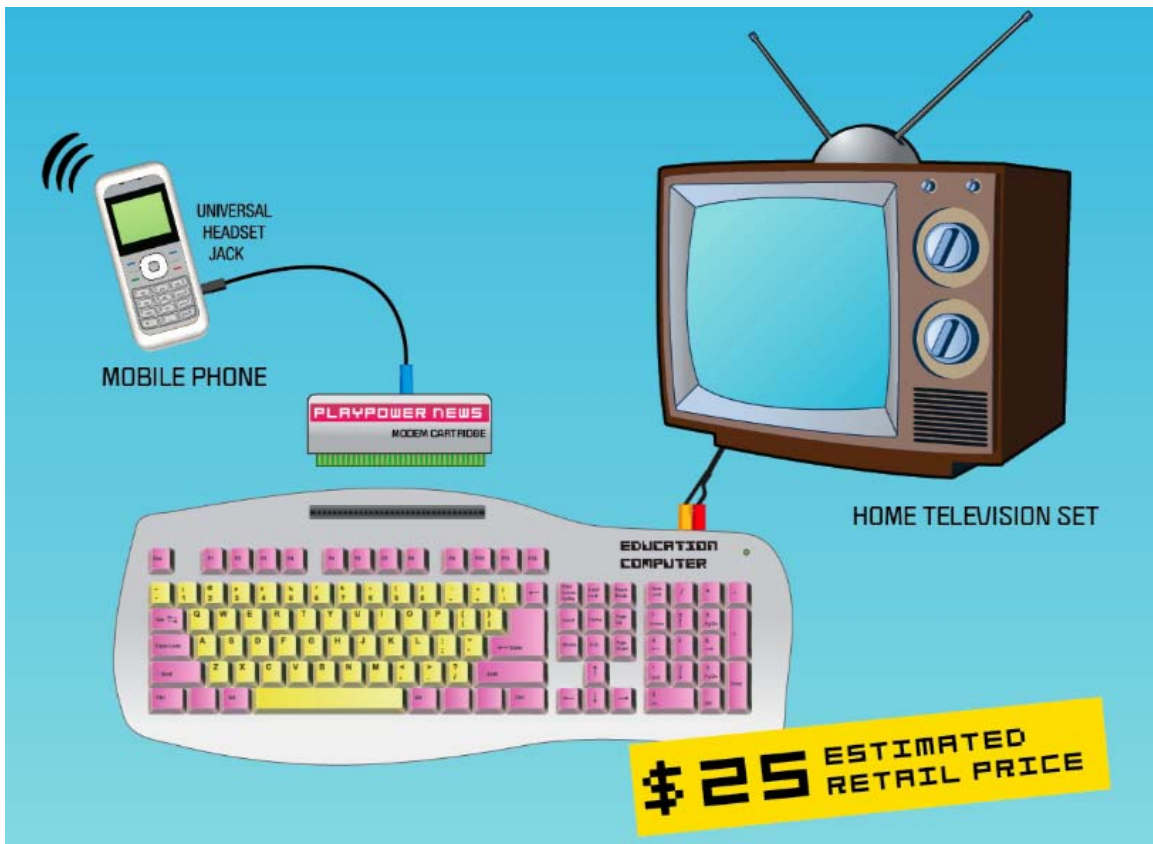
Playpower is seeking to create a Development Cartridge that will open up this radically affordable home computer to software developers around the world. This cartridge will integrate small amounts of SD flash memory, enabling a user to swap memory

between a card reader on a modern computer and the cartridge on the 8-bit TV-computer. Alternatively, USB may be integrated into the system, to allow direct CPU access.

**Modem Cartridge:**

As every mobile phone sold today features a 1/16" headset jack, we are building a modem that can transmit data over the mobile voice channel. This modem will be embedded into a cartridge and plug into a user's mobile phone.

The component costs for this modem, which uses mature IC modem technology, will be less than \$3-4. The resulting technology ecosystem would enable a lower-middle class family to use their existing television and mobile phone to access the internet for less than \$50. While rich media will not be accessible over this system, multi-lingual text-based net access is a mature and highly useful technology.



**Experience Required:**

Ideally, all students will have computer science experience in C, Assembly and Compilers. Experience with flash memory, USB integration, reverse integration, PCB layout, and 8-bit microcontrollers will be very relevant. Experience participating in a open-source community will also be helpful.

More information about this project can be found at [playpower.org](http://playpower.org)  
or by emailing [dereklomas@gmail.com](mailto:dereklomas@gmail.com)