

# Designing Appropriate Educational Games for a \$10 Computer in India

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## Introducing the “\$10 Computer”



In recent years, a curious item has quietly appeared in street markets throughout India: an “Educational Computer” selling for only US\$10 (Rs.400). Lacking both the features and the fanfare of the so-called “\$100 Laptop” from the MIT Media Lab, this humble computer is so affordable because it uses a home television for a screen and a microprocessor originally developed in the 1980s, for which the patents have expired. At left is pictured a typical keyboard-style “\$10 computer” that comes with a working mouse, game controllers, game cartridges, and cords for connecting to a home television set.

While computer ownership in India remains shockingly low (0.6%(ICT profile, India)), is this “TV-Computer” an appropriate solution for the urban poor, if it requires ownership of a television? Yes, according to a recent study (Banerjee, 2008) about the lifestyles of the urban poor, which found over 70% of households own a television (households in Hyderabad, earning from \$1-\$2 per day). This despite the fact that only ~35% of the same households have tap water and less than 55% of their children over 13 attend school. The TV as a computing platform has the added benefit of enabling family social interactions around the educational games, which promotes a form of social learning that may not occur with Personal Computers.

Still, many technologists may dismiss an 8-bit processor as utterly obsolete. However, it is worth noting that dozens of popular 8-bit educational games were developed for the Apple II computer, which shares the same 6502 microchip as the \$10 machine. These games successfully introduced millions of American children to computing and many are still played today. Considering that no computer can be bought in India for ten times the price of our \$10 computer, the educational potential of the machine should be fully investigated.

## Current Problem

While these \$10 computers are commonly marketed as “Educational Computers,” the companies that make them are primarily concerned with keeping costs low and not educating children. In fact, the companies do not have the profit margins to invest in researching and designing effective learning games. As a result, few of the educational games packaged with this computer are engaging or effective. Therefore, to fully explore the educational potential of this machine will require the development of new educational games, based upon the current educational needs and cultural interests of our target audiences: those who might buy a \$10 computer, particularly the urban and rural poor.

## Solution

In order to develop new, appropriate educational games for this machine, we held a ten day workshop at IIIT-Hyderabad from December 10-20, 2009. At this workshop, three teams of computer science students from top universities around India participated in the creation of demonstration games for this computer. In addition to teaching the technical basics of the \$10 computer, the workshop also introduced the students to principles of learning from the learning sciences and a method for analyzing the motivational elements of historical educational games. Needs-assessment, ideation, and storyboarding workshops were conducted over several days, using the IDEO “Human Centered Design Toolkit,” which is a well-respected method for designing socially appropriate technology for development.

By the end of the workshop, the students had programmed the three demonstration game designs using 6502 assembly code. All games were developed for demonstration purposes; they are not finished products, but are effective at communicating a core game mechanic. All games are open-source code and are available at [wiki.playpower.org](http://wiki.playpower.org).

## Conclusion and Future Work

Our 8-bit platform appears to be sufficient for the distribution of engaging educational games that teach typing skills, factual knowledge, and health awareness. Participating students will now proceed to finish the games in an open-source manner at [www.playpower.org](http://www.playpower.org), where additional volunteers may contribute. When completed, the games can be evaluated in the field. If the games can demonstrate efficacy, we will freely distribute the game code to the manufacturers, so that the games can be packaged with new \$10 computers being sold in India. With our games, the computers may attract more buyers, which would further our goal of enhancing the educational opportunities of the urban poor in India.

## DESIGN CASE STUDY 1: “HANUMAN, TYPING WARRIOR”



A skill as simple as touch typing can make the difference between earning a dollar a day as an urban laborer or several dollars a day as a clerk in an office. Therefore, one team set out to create a typing game based on the classical mythological character Hanuman. This well-known character may make the game more engaging and encourage good parental reception.

### Game Dynamics:

- 1.The narrative of the game is the quest for the medicine for Lord Laxman.
- 2.Player has to type the words written in the clouds before the time runs out.
- 3.The cloud will be destroyed by the Hanuman if player types the word correctly and his score gets updated.
- 4.After each level, Hanuman must fight monsters that try to stop him.

## DESIGN CASE STUDY 2: “HANUMAN’S QUIZ ADVENTURE”



Quiz games are famous and well-liked in India, as demonstrated by the numerous hit television shows with a multiple-choice question/answer format. Quiz games can encourage an appreciation for knowledge and furthermore engage an entire family in game play. Therefore, one team created a quiz game that is combined with the popular story of young Hanuman flying up to the sun, which he mistakenly believes is an apple.

### Game Dynamics:

- 1.Hanuman’s way up to the sun has been divided into numerous levels.
- 2.At each level there is an animal that asks him a question.
- 3.Correct answers increase his flying power, which he needs to fly higher.
- 4.Hanuman must avert fireballs spitted out by the sun.

## DESIGN CASE STUDY 3: “SWAT!”



Health awareness is a critical issue in India, considering that more than 80% of childhood mortality in India is caused by preventable and curable disease. Therefore, one team created a fun game based on preventing Malaria, which causes over 1.6 million deaths per year. Because one common video game mechanic involves the repetitive destruction of a large number of “enemies,” the eradication of large numbers of mosquitoes is actually rather satisfying. This team is now creating a full game about the dangers of malaria.

### Game Dynamics:

- 1.Prevent mosquitoes from biting family members.
- 2.Remove the trash that produces mosquitoes.
- 3.Save money to buy important supplies such as mosquito nets.

## References

Banerjee, A. Duflo, E. (2008) “What is Middle Class about the Middle Classes around the World?”. *Journal of Economic Perspectives*. Vol. 22, No. 2. pp. 3-28  
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