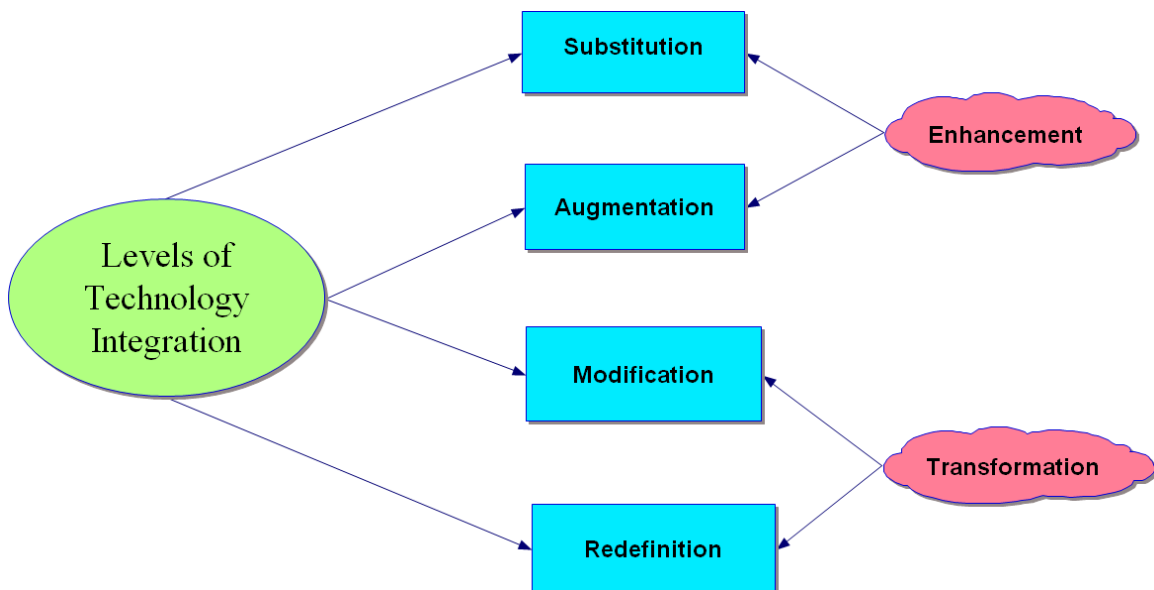


A Model for Technology Integration in a 21st Century Classroom



Technology Integration in a 21st Century Classroom

Ed Barry

The descriptions of technology integration provided in this document are based on Ruben R. Puentedura *SAMR Models of Technology Integration*. Puentedura identifies four levels of technology integration; two of which fall into the Enhancement category and two that fall into the Transformation category.

The categories...

Substitution – *Tech acts as a direct tool substitute, with no functional change* (Enhancement)

Augmentation – *Tech acts as a direct tool substitute, with functional improvement* (Enhancement)

Modification – *Tech allows for significant task redesign* (Transformation)

Redefinition – *Tech allows for the creation of new tasks, previously inconceivable* (Transformation)

In this document I have provided three examples of what this might look in a classroom; one in elementary, middle and high schools. It is quite easy to argue that some examples might better fit into one category/level or another but that misses the point. The idea is to use these as general guides of your own, or others, level of technology integration. The intention is to start conversations about the nature of effective technology integration and to promote the consideration of the relationship between good pedagogy and effective technology integration.

Enhancement to Transformation: An Elementary School Example Community Study

Substitution – *Tech acts as a direct tool substitute, with no functional change* (Enhancement)

As part of the study of “communities” students make a picture book and wall “replica” of their community using *digital cameras*. These pictures are transposed onto a classroom wall and laid out as a “replica” of the town. Using an on-line atlas to guide them, geographical features are added. Next, using a word processor, they write captions for each picture, insert the picture into the word processor, and print them out to make a book that they place in the school library.

Augmentation – *Tech acts as a direct tool substitute, with functional improvement* (Enhancement)

As part of the study of “communities,” students make a *digital picture book* and wall “replica” of their community. They use *digital cameras* to capture community photos and enhance them in a *paint or digital editing program*. The “book” is put into *Photo Story* and shared over the local access TV station as well as placed in the school library on *CD* for others to view.

Modification – *Tech allows for significant task redesign* (Transformation)

After going on both walking and bus tours of their community during which students take many *digital pictures and video*, students create a *virtual museum* of their community. Working in teams, students select their favorite landmark of building and do further research on the site. They interview local citizens recording their

interviews in *digital recorders*. Next, using *Audacity* voice editing software and music from free music sites on the *Internet*, they create *podcasts and vodcasts* on their site and with permission, include excerpts from their interviews. The *podcasts, vodcasts* as well as *digital pictures* are incorporated into the virtual museum using a tool like Thinkport (<http://museum.thinkport.org/>) or other site.

Redefinition – *Tech allows for the creation of new tasks, previously inconceivable* (Transformation)

Students have volunteered to give a virtual tour of their community to the new employees of a significant new employer in their town.

After touring the community on foot and by bus taking *digital pictures and video* as they go, students use *Google Earth* to identify important locations. Upon viewing the finished map showing the important student-selected locations, students discuss their findings, sharing such things as which locations might be most important to new employees and why.

Students select a location and, working with a parent partner (or other significant adult), gather additional information on their location, including the history and present use, by conducting interviews with family members, relatives, and/or neighbors who have information about their selected site. Interviews are recorded in a *digital voice recorder*. In order to keep their teacher as well as other teams up-to-date, the student-parent teams *blog* about their research in a secure blog site that the teacher has set up. With their parents and/or teachers assistance, students organize their information in Bub.ul.us, an on-line visual organizer.

An image of the map showing all the selected locations in *Google Earth* is uploaded into a private secured *VoiceThread*. Student-parent teams take turns recording information, adding visuals and, with permission, snippets of the interviews that provide information on their location into the *VoiceThread* project.

The *Google Earth* tour of the student selected “special locations” in their community and the *VoiceThread* are presented at a special showing to the employees of the new business. Parents, town officials and interested community members are also invited and receive a *Tweet* from their school that has developed a sizeable *Twitter* following. The student presentation is shared over *video conferencing* with the company headquarters which is located in a different state several hundred miles away.

**Enhancement to Transformation:
A Middle School Example
Ecosystems**

Substitution – *Tech acts as a direct tool substitute, with no functional change* (Enhancement)

Students study various ecosystems through the use of *computer simulations* and by *watching videos from various Internet sites* on topics ranging from the Food Chain to the Water Cycle. Students, working in pairs, selected their “favorite” ecosystem and, after doing Internet research, made a *PowerPoint* presentation to class.

Augmentation – *Tech acts as a direct tool substitute, with functional improvement* (Enhancement)

After doing initial research on the *Internet*, students learned more about important concepts by working with several teacher-made “*smart board*” lessons. They manipulated symbols on the “*smart board*” to show how the

Water Cycle, the Carbon Oxygen Cycle and Food Chains functioned. They collected images from magazines and *scanned* them into folders on their computers. The images were used in a *Photo Story* presentation to demonstrate their understanding of the important concepts in the unit.

Modification – *Tech allows for significant task redesign* (Transformation)

After an initial introduction to the major concepts in the study of ecosystems by their teacher, students identified “back yard” ecosystems and through these mini ecosystems studied the important concepts in the functioning of a balanced ecosystem. Working in teams, they recorded events and changes with *digital cameras and camcorders* using time-lapse when possible and feasible. They used *digital probes* to record fluctuations in temperature, moisture and light. Students *blog* daily about the functioning of their system and recorded important information in a class *wiki* that their teacher set up so they could compare and contrast the changes in their ecosystems. For their final presentation they used a variety of technological tools including making digital stories, *Glogster* posters, and using “*Scratch*” authoring language to demonstrate what they had learned by creating interactive games, stories, animations or music.

Redefinition – *Tech allows for the creation of new tasks, previously inconceivable* (Transformation)

In this project students from communities that border the Lamoille River collaborate in a joint study to better understand how the river ecosystem has in the past and will in the future influence and impact their lives. Each participating school is made up of six to eight teams each in a collaborative study with students from the other schools. Student select topics that interest them, including recreation, history, pollution, commerce, etc., and view these through the lens of their impact on the river ecosystem, past, present and future.

Student teams join forces with employees of the *Departments of Fish and Wildlife & Natural Resources*, the *Vermont River Conservancy* and scientists from a nearby college to identify and collect data on issues of importance to the present health of the river ecosystem. Teams meet weekly via the *Learning Network of Vermont* video conferencing system with their experts and their lead teacher who is one of the teachers from the participating schools. Students communicate and collaborate using a *Wiki*. Individual teams meet regularly using *Skype*. *Survey Monkey* is used collect and record data about community members’ use of the river as well as their attitudes about the care and health of it. Information is stored in a database where it can be analyzed and studied.

Students use digital probes, digital cameras and camcorders or other digital devices to collect data. They upload their images to *Flickr* and movies to *YouTube* so they can be shared with the public. In some communities, students set up a *Voice Thread* and invite community participation in collecting data and/or sharing their knowledge of specific issues related to the health of the river ecosystem. In other communities, students start a *Ning* social network on the river and invite community members to join in the conversations regarding the health of the river.

To assist in their research, the teams plot different points on the river using use *GPS* technology and enter it into *Google Maps/Earth* for visualization purposes.

Using a digital story format, students prepare presentations and recommendations to appropriate the Department of Natural Resources, state-wide committees as well as the appropriate House and Senate Legislative Committees whose job it is to be stewards of the river.

Enhancement to Transformation: A High School Example Global Warming

Substitution – *Tech acts as a direct tool substitute, with no functional change* (Enhancement)

After reading in their textbook, listening to their teacher and researching in the school and town library as well as the *Internet*, students use *Inspiration* to organize their ideas and, using a *word processor*, write a report the impact of global warming.

Augmentation – *Tech acts as a direct tool substitute, with functional improvement* (Enhancement)

After researching in the school and town library as well as the *Internet*, students, working in groups of two, use an on-line Web 2.0 visual organizer such as *Bub.ul.us*, to organize their ideas. They co-create their report in *Google Docs* and invite their teacher to be an editor on the document. Once final edits are made, students publish their results in a newsletter format using *DeskTop Publishing* software and distribute it throughout the school.

Modification – *Tech allows for significant task redesign* (Transformation)

To obtain up-to-date and relevant information on Global Warming, students interview experts using the *Learning Network of Vermont* and *Skype*. They also use *Survey Monkey* to collect information on local attitudes towards the global warming issue. They devise a plan to collect data from various local sources they have identified as contributing to the global warming issue and use a *wiki* to share their data and plan their next steps in the research process. After analyzing the data, students post their results on the *web* and advertise in the local newspaper so the community is aware of their work and website.

Redefinition – *Tech allows for the creation of new tasks, previously inconceivable* (Transformation)

After searching for partners at the *Center for Interactive Learning & Collaboration* (www.CILC.org), students work on a year-long interdisciplinary project in partnership with student teams in Canada, France, Japan, and Australia in a “mini competition” to create realistic and implementable plans to reduce the carbon footprint of their local communities. Using a *wiki* to share information and ideas, they work closely with local governmental officials, compromising as necessary, to make the plan realistic. Students partner with researchers at the local universities in each country as well as scientists who work for a major international company that is working on alternative energy resources that would lower a community’s carbon footprint. Project participants create a presence in *Second Life* where they interact with each other sharing ideas and brainstorming possibilities. They create model virtual communities based on their shared ideas. Additionally, they use *video conferencing* (*Skype, LNV*) to meet regularly with their partner scientists and occasionally have the local governmental leaders in each of their communities meet to discuss common problems and potential solutions. Students create a video documentary of their work and post it on various sites such as *YouTube*. As a part of this collaboration students win commitments from their local governments to implement parts of their plans.

Copyright 2009 – May be used with permission