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http://deimos3.apple.com/WebObjects/Core.woa/Browse/education-maine.gov.1835411146.01835411149.1835189604?i=213677147

The SAMR model is a model I developed starting in the late 80s, early 90s, to answer the question of what types of technology use would have greater or lesser effects upon student learning. The name comes from the four levels of technology use that I've found could be related directly to results in terms of what happened on the student side. So *S* stands for substitution. This is the lowest level of technology used. Here we're looking at using the technology as a direct substitute for an earlier technological form, without changing anything about it whatsoever. So if you used to use a typewriter and now you use a word processor, but you don't use any special features of the word processor, you're working at the substitution level.

The next level is the augmentation level. At the augmentation level, you find that the technology acts as a direct substitute for a tool but then you start adding some improvements, some functionality that wasn't present in the earlier tool. So for instance, in a typewriter example, now you're using the word processor, but you're also using the built in spell checker, you're using the cut and paste features. In other words, you've added some functionality that used not to be there. In terms of the results that you see with students, the substitution level tends to give you little to no effect. You may find that some substitutive uses are very good, very important, but you shouldn't expect to see great changes in student performance as a result of them.

Augmentation does a little bit better. In general, you'll find some small, some fraction of a letter grade, to put it crudely, change in student performance. However,

things get really interesting when you go to the next level, which is the modification level. Now this is the point at which the task that you're looking at is going to be significantly redesigned by the introduction of a new technology. So now, if we stick for instance with the word processor example, you're now talking about incorporating networking tools such as email, such as blogs, such as social software, so that your word processing document is no longer just something that's going to be printed and distributed on paper, but instead something that's going to be used as part of a group process for writing, for analyzing, for thinking. When we look at this type of modification process, now you start seeing significant changes, significant improvement in student outcomes. Again, to put it roughly, you could be looking at something on the order of the equivalent of a letter grade improvement in student results.

The final level is the redefinition level. At the redefinition level, you're now looking at new tasks that obviously you want to do, not just any arbitrary new task, but that have been previously inconceivable without the technology. So for instance, now in a word processing example, you start looking at documents that can be used as living documents. These are documents that no longer are static because they're printed on paper, now you're starting to think about all the new types of documents that you weren't creating before that would be useful for people to have, for people to use as thinking documents, that you simply couldn't create before when you were looking at pen and paper or a typewriter.

At this level is where you see the most remarkable improvements in student performance, all other things being equal of course. We're assuming that we're looking at well designed course. You can see, we have the introduction of technology at the redefinition level, roughly the equivalent of two letter grade improvements in students' performance. For this reason, we can draw a line between the two levels of substitution and augmentation and modification and redefinition and call the first two levels the

enhancement levels and the other two levels the transformation levels.

Again, I want to emphasize something before going any further. While it is true that operating with technology at the redefinition level gives you the most bang for the buck if you will, any one of these levels of technology use can be useful and valuable in the appropriate context. And we're in fact going to look at some examples of each of these. So let's take it from the start and just look at the substitution level. At the substitution level, we could be looking at a course, let's say it's a literature course, it's a literature course focusing for at least one of its units on Shakespeare's *Macbeth*. And at this level, a teacher could say well, I'm going to use NoteShare and I'm going to drag and drop different links from the web of which correspond to things like the original text of *Macbeth*. I could also drag in critical commentary. I could also drag in some books about the Shakespearian stage and finally I could look at YouTube and find some of the classic performances of *Macbeth* on film and drag those links in. Now this is at the substitution level. What I have here is the equivalent of what we use to do by putting together a library list or a reading list, using paper and using the library. It's very nice that all of these resources are available for free on the net and it's great and very convenient for this list to be available to students with all the links already built in. But it's clear that it is a direct substitution for the traditional form. In other words, at this point, we are using the technology just to substitute for what we would have done before with the library and with a type written list.

To change this to the augmentation level, there's only one very small change that's needed. And that is to add to the list of these resources some materials that do not fall within the scope of what would be in a traditional library. But instead make use of the unique possibilities that the Internet offers as a social environment. So here for instance I've included a link to the Flicker Shakespeare group. So students can see how the people visualize Shakespeare in photos. And these aren't by the way, just photos of straight

performances; they're photos that represent different people's artistic approach to Shakespeare.

You can also have students interact with different blogs. Some blogs are just resource blogs, but they do carry up to date information on what's going on in the world of Shakespeare around the world. Other blogs allow for more interaction by the students so they can enter into a dialogue with Shakespearian play directors, Shakespearian scholars, etcetera. All of these things augment what was possible before with a traditional library list and again bring in a whole new world of resources for students.

At the next level, which is modification, we're going to have to do a little bit more work. There are lots of paths that we could take to reach this goal. I'm just going to highlight one of them. I mentioned earlier that we have visualization tools to look at complex information. And one of the things about a complex play like *Macbeth* is there are multiple layers of meaning. And that meaning is encoded in words and sequences of words. And we now have via sites such as IBM MiniEyes, access to tools that allows us to visualization just that, just those sequences of words, the frequency of word occurrence. So for instance, here are the 100 most frequent words that appear in *Macbeth*. And if you look at this list closely, you'll find that the word 'blood', which is frequently mentioned in critical analyses are being essential to the meaning of *Macbeth*, is indeed one of the words that appears frequently. But also note that the word 'time' appears much more frequently as does the word 'fear'. Now this is very interesting because when we look at different stagings of the play, some have chosen to prioritize blood as the running motif, some have chosen to prioritize fear as the running motif. So this is a tool that significantly modifies what the students can do with the material, how they can understand what's going on in *Macbeth*.

We're not talking about getting rid of the traditional analysis; we're talking about

bringing in a significant addition, a significant compliment and yes, a significant redesign of how students understand literary text via this tool.

Finally, we will look at the redefinition level. Now at the redefinition level, remember that we're talking about creating new tasks. We're not just talking about significant redesign, we're talking about what can I do that I could never do before? So again, many different paths that I could choose to take at this course, but here's one of them.

I could say I want to stage *Macbeth,* or rather I should say have the students stage *Macbeth,* to an audience on the net using all the knowledge they've gained from the links I created at the substitution level. The additional links that connected them to a community of other creators at the, at the augmentation level, the tools incorporated at the modification level to enhance their understanding of what's going on in the text and now at the redefinition level then, we have tools for staging plays in 2D on the net, Upstage is one such tool or in 3D this has been done already several times in Second Life.

So now this is completely inconceivable before, yes, students could always stage *Macbeth*, but they couldn't stage it for an audience outside their own community, a broad audience that would give them feedback that they've never gotten before, perspectives they would not have gotten before and in a medium that's completely different, whether in 2D or 3D from the medium of live performance. So at this level, this course would then incorporate the technology in a form of redefinition. So these are the four levels.