

Submission to the workshop: Inclusion through Design and Use of Digital Learning  
Environments: Issues, Methods and Stories  
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## What time is it? Using autonomous technologies in a learning environment

This is a story from an classical educational setting, involving approximately 150 students and one lecturer, and many people “backstage”. It is 09:55 in the morning during the winter. We are at the university in a lecture hall with about 300 seats. This morning, a steady flow of 1st year bachelor students enter the room. I am in the room to prepare for lecture that is scheduled to start in 20 minutes, that is at 10:15. The preparation is to get the Audio Visual equipment to work; ie. to set the audio levels, and the light levels - and to find the right voice and video recording equipment that will be used for screencast. In front of me, there are five fixed screens - in addition to the mobile phone screen and laptop screen that I have brought with me.

There is a breakdown situation occurring this morning. The wall clock indicates 10:00, that is it is not indicating the correct time. There is a “correct time”, the one traditionally given on TV or presented on the radio “time is now...”. Today, we use a server on the net to present the “correct” time - or check the mobile telephone.

I glance to the large wall clock, now indicating 10:05 - is it my wristwatch that is correct or is it the wall clock? If it is the wall clock, there is only 10 minutes left until we start the lecture - and that's “just in time” to get the recording equipment to work, and to get the powerpoint slides up on the wall. I check with a web service, time.is to find out what the correct time is - and by comparing results i understand that the wristwatch is ok, the time on the wall clock is not. Stress and frustration level is high!! What I ideally want to do before a lecture is to smile and calm down, and be present.

It is hard to keep calm when things are not in order. We all, approximately 50 students now in the room, have access to the wall clock. But it does not show the correct time - five minutes out of sync is 300 seconds, and that matters when starting a lecture. If we are 150 students, then 5 minutes equals 750 minutes in total.

We all get used to wall-clocks, or any other stationary technology that is not working properly with time. However, it is frustrating - also this morning. Do I inform the students that the time indication on their mobile phones are correct, the wall clock not? Does it matter? I do not want to start at 10:10 (when the wall clock indicates 10:15, because that's not fair to the students

coming the next five minutes. So I decide to write on the blackboard a note that we start when the wall clock shows 10:20.

Approximately 40 minutes later. During a question and answer session happening now, I glance at the wall clock and it indicates 11:01. Oops, I had forgotten that the wall clock does not tell the correct time. Feeling really stressed and uncomfortable - and removed from the topic we were discussing during this session. I sense that many students also have forgotten - and that by their habit they look at the wall clock.

This might seem like an everyday and trivial situation, but nevertheless it matters. Stationary equipment in a lecture hall, be it wall clocks or video walls, or audio equipment with controls are all examples of computing technology that is used infrequently, perhaps only a few times each year by lecturers and students. I have not mentioned the issues related to getting a laptop computer to work with the audio visual equipment in lecture theatres, but we all know how frustrating it can be to get this to work. Why is it like this?

How do we tailor the interface and the interaction in for example lecture halls so that it is possible to adjust and make it work for the individual students and the lecturers? Who is in control?

In order to adjust the wall clock, I sent a few e-mails to different departments - and got various feedback on the issue. One was that this clock was "automatically radio controlled, and should therefore be correct", and one that "this is a known problem, and it is a different department that has the responsibility for the room itself - not the Audio Visual and IT department". How do I customize this interface? A telephone number to a person to talk to - who is an expert for the equipment in the room? A room where there is minimal fixed equipment - and only mobile equipment that lecturers and students bring themselves - that are already customized to each person?

The "simple" clock is not a prosthetic machine that strengthens or extends our muscle power. Neither does it extend our senses. It can be said to be an autonomous machine. An autonomous machine that once started and adjusted "runs by itself", on its own, on the basis of an internal model of the world, some aspects or characteristics of something. If we open the "black box" of a clock, we find the two modules: 1) an oscillator 2) a counter. Something with a regular frequency is counted, and based on this the time is presented to the clock-user. For example with "hands" and "dials" or as numbers. Basically, clocks can be said to be based on models of the planetary system. In that sense they are one of the first autonomous systems that we have seen.

The interaction with autonomous systems, like the wall clock in this story, raises some important questions I believe.

- a) If the machine or system is autonomous, how to report malfunctions or breakdowns when it is not working?
- b) Who can decide whether there is a problem when interacting with a autonomous system? It is after all designed to be “autonomous”, and hence work accordingly?
- c) Who is authorized to “adjust” autonomous technology? The end user? The super-user? Some responsible institution?
- d) What will tailoring of autonomous technology entail? In what ways is it possible to open up for end user tailoring of autonomous technology? Will this result in “reducing” the autonomy of the technology in question?
- e) How can we think about “independent” students and teachers - and autonomous technologies that are to work in concert?

In an ideal world, things work and do not break down. In the world we live and learn in - faults, problems, breakdowns, updates and changes will happen. The question I attempt to address here is how we as users can interact, change and tailor autonomous technologies like this clock? This as a way forward for not being excluded from the technology!