

Constructionism and the Teaching of ICT

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The prevalent methodology for teaching Information and Communication technology (and, to a lesser degree, Computer Studies), is constructionist. Like constructivism, constructionism centres around a view of learning as a process of building knowledge structures. In addition, constructionism maintains that such cognitive constructions are especially facilitated when the learner is engaged in constructing a "public entity" (Papert 1991 p. 1) - an artefact which fulfils some real, possibly social, function.

It is commonplace to maintain that we learn by 'doing', but doing WHAT? Constructionism takes the view that people learn ICT skills in the CONTEXT of USING ICT tools to carry out a TASK which is viewed by the learner as being WORTHWHILE. It is clear that many exercises we set students are not viewed by the students themselves as being WORTHWHILE, but mere exercises. Constructionism provides the following guiding principles:

1. Contextualise learning: avoid teaching skills and concepts out of context - we learn best when we can RELATE new concepts, skills etc. to an identifiable situation.
2. Just in time learning: avoid teaching skills and concepts BEFORE students need to use them. Instead, try to introduce new learning at the point when the students are ready to make use of it.
3. Project-based learning: avoid assigning make-believe tasks. Instead, show students how to use ICT to carry out interesting and productive tasks, things they LIKE and NEED to do NOW. Remember, that we are NOT teaching a specific software package, but showing students HOW they can make use of ICT to solve a variety of problems.
4. And finally, avoid teaching - instead, try to promote LEARNING. Increasingly, a teacher's job is to POSE challenging questions, NOT provide pre-packed answers. Encourage a diversity of solutions, but also encourage students to be critical (since not all solutions are necessarily equally viable).

Project-based learning

This points out a method we can use in teaching ICT. Devise a number of non-trivial projects which together will cover all the skills and concepts listed in the syllabus (and possibly some more, too). For convenience, the syllabus is structured logically in modules which group related skills and concepts. BUT this is not necessarily the best way to teach the subject - typical projects will require pupils to use a variety of ICT tools which do not necessarily fall neatly under the same heading in the syllabus.

Good projects must be non-trivial and relevant to the age group you are teaching. The following are some guiding principles in selecting appropriate ICT projects:

1. A typical project will last for about 5-7 weeks (i.e. lessons). Shorter projects tend to be over before students really have time to get properly involved. Longer projects tend to start becoming boring after the initial enthusiasm wears off (of course, there are ALWAYS exceptions!). Moreover, this way you can nicely fit two projects per term.
2. Choose relevant and interesting projects. Think about what the students you're teaching would want to use ICT for in their lives. There are MANY useful and productive things the average 14-year old can use ICT for - mail merging circulars is usually not one of them!
3. Choose REAL projects - something which in the end will leave the students with a sense of achievement and a product which serves some purpose. Make-believe projects are usually not a good idea - a DTP project in which students are asked to design a flyer for a fictitious company serves no useful purpose whatsoever: why not get students to design a flyer for an actual school event and then USE their flyer to advertise the event?

Typical ICT lesson structure

An I.T. lesson (45-minutes) is typically structured as follows:

Phase	Approx. duration	Description
Settling down	5 minutes	Orderly entry into lab, taking attendance, handing out diskettes etc.
Introduction	5-10 minutes	Review of previous lesson and overview of day's work. Brief explanation of worksheet and of main points. Possibly on-screen demonstration of
Body	25-30 minutes	Pupils work from worksheet/s with teacher monitoring and giving individual attention as required.
Conclusion	5 minutes	Saving and closing down application or system. Review of day's work and reinforcement of main concepts encountered (elicited from students themselves). Explanation of any follow-up task/s or remote preparation.

The bulk of the lesson must be the hands-on phase, with pupils working at their own pace from worksheets. AVOID whole class teaching, where you try to direct the whole class step by step through a process - not only is it difficult to ensure that everyone works in step, but pupils will not

be able to repeat the task on their own next time round. Well-designed worksheets solve this problem. Good worksheet design requires that the worksheet:

1. is easy to follow. Use Maltese if pupils have difficulty with English. Explain things clearly, preferably using annotated diagrams and screen shots. Do NOT skimp on paper - after all, you only need to make as many copies as there are machines, since pupils need NOT take the worksheets away with them;
2. gives clear, step by step instructions about how to carry out a process. Such instructions should be accompanied with screen shots. At the same time, it is important that the worksheet ...
3. does not require pupils to simply follow instructions blindly. There must be challenging tasks and questions which require pupils to think for themselves or to experiment.

Pupils may not be used to worksheets, so you may have to train them in how to work from instructions on a worksheet rather than expect the teacher to handhold them through their tasks. Leave a complete set of worksheets by each computer so that pupils may refer back to previous worksheets if they need to recall something they had done in a previous lesson. Encourage them to take down notes both from their worksheets as well as from the online help, but avoid dictating notes yourself.

PAPERT, S. *"Situating Constructionism"*, Chapter 1 in HAREL, I. & PAPERT, S. (eds.) *Constructionism*, Ablex Publishing Corporation, New Jersey, 1991