

The capacity for learners to use multiple media through ICT increases the opportunity to work in alternate modalities to the predominant text. ICT simplifies the production of visual & aural media as well as helping to make viewing & listening a more delightful engagement with material. Of even greater consequence is the potential for (re)construction in film, hypermedia (networks of information) and linear presentations. Such integrations of multiple media are perhaps the most demanding of expressions, not only anticipating audience viewing but also audience choice of sequence.

A powerful spur to more complex expressions of ideas is the ability to re-express cheaply and repetitively. The potato print transforms a simple shape into a rich pattern, the 'automation' provided by this simple tool allows a variety of re-arrangements of the shape to be explored at low cost and with reliable quality. Computers provide this kind of automation and much more, through copy and paste in almost every program, through formulae and 'Fill down' in a spreadsheet and, most important of all, through programming languages.

The computer frequently pleases, aesthetically and affectively, in a way that delights the learner. This positive mood is clearly valuable to creativity, as a means of sustaining motivation at the very least.

For many learners, starting is difficult because making mistakes has such a disastrous effect on continuation. Many young people in schools use correction fluid to eradicate 'errors', or resort to ripping pages out of books in order to achieve a 'perfect' copy. Provisionality arises when one can begin developing ideas and, at little labour cost, perfect and re-draft those ideas with no evidence of the false starts. This means that creativity is promoted, one can start recording ideas out of order, in draft form and incomplete. Confidence then unlocks ideas, which might otherwise be considered not worth expressing.

ICT tools can promote the development of ideas, paradoxically, by constraining the universe of possible expressions. In many of the arts, the choice of constraint can lead to greater fertility by focussing on specific aspects of ideas – this kind of limit can offer similar gains in ICT. In graphic programs, limits on the position of the cursor to a grid can lead to the rapid development of diagrams. In geometry programs, constraints can help learners see important connections and propose new interpretations.

After some acquaintance with computers over a period of time, young people see through any pretence of intelligence or life in a computer and thus begin to see it as a neutral tool which although it may offer canned feedback, is clearly incapable of judgement.

Computers allow students to 'say things out loud', but without judging those things in an interpersonal manner. The computer is a silent helper in this sense and can be trusted with half-formed ideas and ideas which follow the students creative impulse.

ICT media are unique in that little imprint of the creator's weakness in production are seen – perfect fonts, geometric accuracy and colour faithfulness permit the weakest of learners to produce material which compares, on the level of media quality, with that of the most experienced professional. This means that learners' self-esteem, which is so heavily knocked by poor handwriting, inaccurate drawing or inadequate oral skills, can be raised. This in turn encourages risk-taking and attention to the content of ideas – continuing engagement which can promote attention to higher-order issues.

How can technology enhance learning?

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Using projectors or large screens in a classroom context, learners share a knowledge context and background, debate together, seek each other's views and respect diversity but also work towards consensus. The projected computer screen is a focus for representing the current state of the ideas being developed by the class and for judging quality and accuracy of expression. A wider, but identified audience can be found by publishing material on web pages so that the globe can take part in the evaluation of ideas and work. The power of potential audience to support both expression and evaluation is very real in the mind of the learner and can provide powerful motivational force and raise ambition.

Computers offer a powerful tool for certain ideas, which are developed in symbolic, formal languages. These include diagrams, spreadsheet formulae, programming languages and database design. If these formal systems are used to develop ideas, then it is possible for the computer to 'execute' them or analyse them and display their consequences. Often, in order to judge the success of an idea, this output can be compared to that anticipated, and evaluation independent of a peer or teacher can take place. The programming language Logo has provided a powerful example of this effect, in some cases leading learners into extraordinary intellectual and creative endeavour.

Most work on a computer can be saved for later perusal or at intervals to record drafts. This can help learners see how their ideas have developed, or peers & teachers to understand and judge their originality & value. In the long term, work that has been compiled provides the basis for a portfolio of work, which can be used to represent the learner's capability. It also may be efficiently mined for new starting points, new connections can be made between past work and present concerns. Often surprising insights can be obtained, because ICT has recorded the work and allowed searching and indexing to take place.

