

Thinking about Effective Computer Software, On-line Content and Games for Teaching and Learning

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What is educationally effective content?

With any type of software or on-line content, educational effectiveness is heavily dependent on the context of use. So, for example, the Science Museum on-line resources can be used to support learning of specific science vocabulary and concepts within a course of study, or can be used more casually to provide supplementary information for pupils. Either is a valid use of the material, but the discernible outcomes for learners may be very different. The teacher's structuring and framing of a pupil activity based on and around content strongly influences learning outcomes, as does the pupil's perception of the purpose of the activity.

There are some features of on-line content which can be specified as of the utmost importance. Getting these key aspects right is crucial if the resource is to be of use in education. These features can be identified as criteria for evaluation of content by teachers; and they are also likely to be useful as criteria for design by developers. (<http://www.becta.org.uk/technology/software/curriculum/evaluation1.html>)

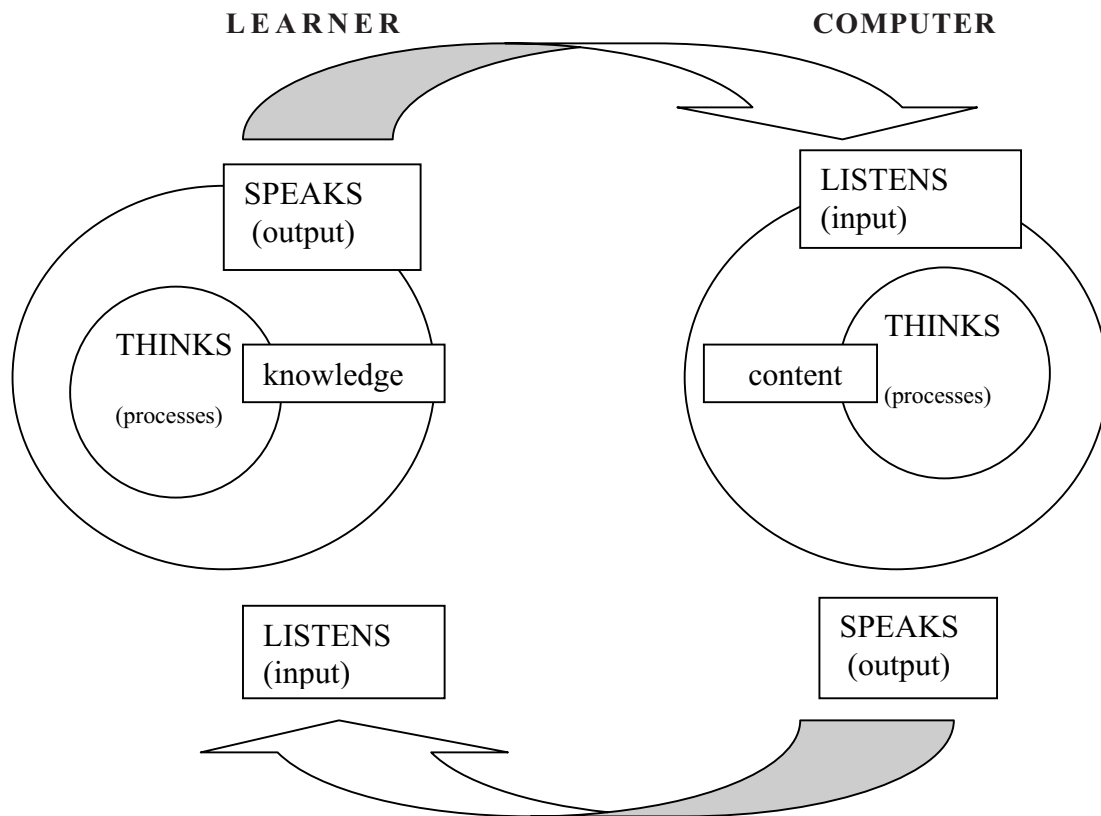
Some criteria for evaluation of on-line resources for education

- Does the content make its educational purpose explicit?
- Is the content accurate, up to date, free from bias and presented in appropriate vocabulary, reasonably comprehensive, objective, and contextually relevant for the learner?
- Or, if these first two criteria are not met, can pupils identify the purpose, bias or failings?
- Is the interface clear and intuitive, with well-organised material and good navigation?
- Can the resource enhance collaborative learning?
- Is the learner provided with feedback which checks for understanding and provides support?

Interactivity and collaborative learning

Definitions of interactivity abound as the word evolves and makes its way into common vocabulary. The term 'interactivity' is currently used to describe anything in which an action has an immediately discernible effect. In software for education, meaningful interactivity is what is required. One of the main reasons why computers have enormous potential for education is that they offer real opportunities for meaningful interactivity.

That is, computers can allow learners to engage with content in ways which promote learning. 'Interactivity' is often used to describe superficial engagement with the computer interface or with meaningless, albeit harmless, activity. A useful metaphor for the best sort of interactivity is that of a *conversation* between the computer and the learner. The conversation is a turn-taking dialogue of **listening** (input) **thinking** (processing) and **speaking** (output), as illustrated in the diagram opposite.



Interactivity as conversation has the potential to promote learning. The ‘conversation’ works best if all three operations are well done, by both participants. So, software designed for group work should be able to accept input, process it and provide output which promotes conversation, with no loss of quality at any stage. At the same time, software can support the learner or group who have the purpose of making meaning from the content. A good ‘conversation’ is therefore one in which concepts are generated and formulated, ideas understood and information assimilated, memorised and contextualised. So, effective software can provide the learner with simultaneous access to content and to the ideas of others, which is one reason why the integration of ICT into classrooms has created such interest and enthusiasm within the teaching profession and society generally.

In classroom settings, two ways that computers can be used are:

1. The individual learner interacts with the computer.
2. Pairs or groups of learners talk about their interaction with the computer.

Some of the best software will not only interact with the learner but encourage learners to interact with each other. Computers can support productive interaction between the teacher and the learner, or between learners. This facility, to support learner interaction, is one of the most exciting options that

computers offer education. The potential for learning and development is transformed as learners converse with each other and interact with the software, pooling their joint mental resources to allow each learner to do better than they could alone.

The conditions which affect the quality of this process are:

1. Provision of *good quality software or on-line content* with educational purpose, which offers support for collaborative learning.
2. The *teacher’s structuring of the task or activity* to create the conditions for educationally effective interaction between themselves, computers and learners.
3. *The ability of the learners to interact effectively through talk and on-line communication*, and their understanding that this is a critical aspect of their work.

Computers support learning as a social activity. Individuals working on separate computers may confer with one another in a range of school, library, home and workplace settings. Encouraging such social thinking is educationally effective in that talk allows people to put thoughts into words, to defend and elaborate their ideas, to recall previous

thoughts and suggest revisions, to justify assertions with reasons. Undertaking this process allows learners to refine and extend their thinking. Such *creative collaboration* offers other benefits for the learner too. Learning to work in teams is extremely important, as is learning to use the specialised vocabulary of a discipline or community, valuing the ideas and opinions of others, and becoming an independent thinker whilst retaining an awareness of what is to be gained by rational discussion. Effective on-line content can help learners to understand the power of collaborative conversation with others as a *tool for thinking*. Assuming that there is supportive teaching, on-line content can offer direct help to pupils who are working together in a group. (However, this 'help' may be ignored by pupils who are unaware that the quality of their discussion is of key importance). Software designed to help establish and sustain collaborative work will offer:

- Challenges and problems which are meaningful to the children, and which provide a range of alternative choices that are worth discussing. Such challenges should engage the children with the content of the software rather than its interface.
- A clear purpose or task which is made evident to the group and which is kept in focus throughout.
- On-screen talk prompts which ask the group to talk together, remind them to reach agreement and ask for opinions and reasons.

- Feedback which provides information on which decisions can be based, and opportunities to review decisions in the light of new information.
- Few or less opportunities to take turns or establish competitive ways of working.
- Multi-choice responses to minimise typing.
- A teachers' pack which enables the teacher to establish ground rules for talk amongst the class, and ensure that quality talk is an explicit aim and focus for group work.

Summary

Whether on-line content is educationally effective largely depends on high quality design with a clear educational purpose, and the explicit and mutual aims of teacher and learners using the software. Educational purposes are achieved through meaningful interactivity which makes good use of technology. Content can usefully support learners who are working in collaboration so that thinking together allows high achievement for each individual.

Further information

The Becta Curriculum Software Initiative has the aim of supporting the generation of high quality resources for teaching and learning.

<http://www.becta.org.uk/technology/software/curriculum/index.html>