CHAPTER 4

Levels of Media Interactivity

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Introduction

In the last decade, widely available educational media such as radio and television have been supplanted in many regions by the Internet, owing to the greater levels of direct contact and feedback it can provide between the teacher and students. The lack of real-time interactivity in traditional educational media has been perceived as a particular disadvantage in distance education. It is now possible, however, to combine the increasingly available cellphone with any other medium, to enable students to respond immediately and in various ways to the teacher's presentations, points and questions. The new techniques made possible by this hybridisation are likely to extend far beyond the educational field, into mass media broadcasting, political and advertising research, and training and development contexts.

The current account will focus on the potential educational value of combining the cellphone with live/ recorded television; for, second to the Internet, TV still provides a greater range of multimedia stimuli than any other single medium. The techniques made possible by Internet interactivity will be classified in a series of twelve interactivity levels. These are characterised by the extent of interactivity between the student and recorded material, the student and the teacher, and the teacher and many students simultaneously.

Levels of media interactivity

Table 4.1 indicates twelve levels of interactivity currently available when online techniques (browsing, e-mail, etc.) are used by one or many students in interacting with packaged materials or a teacher. The original 'interactive video' concept of the 1980s, developed with the advent of the videodisc, as its many online versions today, only fulfill *Level/1* in this classification scheme. This basic level refers to students 'interactions' with pre-recorded/ programmed material, as in web-browsing, though not directly with a teacher. Human interaction, regarded as the missing ingredient in many earlier educational media situations, occurs in basic forms in *Levels/2 to 5*, via the techniques of e-mail, online polling, and text-conferencing. At *Level 6*, a higher form of real-time interaction between teacher and students occurs in live text-chat methods; and *Levels 7-9* indicate the successively higher levels of interactivity

achieved by adding audio, video, polling and combined techniques to conferencing, polling, and 'social networking' software. *Levels 10-12* relate to new opportunities created by combining the cellphone with other media (e.g. TV) to enable real-time polling and instant feedback of results to many students at once.

The twelve levels of media interactivity are defined as follows:

1) The most basic level of interactivity occurs when a student *browses through computer-based materials*, making commands that generate presentations of specific material. 'Interactive video' materials have used this level of interactivity since the 1980s, although no human interaction takes place. Web-based materials can be used, via either PC or 3G cellphone.
2) More interactivity is possible when the student communicates asynchronously with a teacher, as via *e-mail*. In addition to the usual technology (computer with Internet), a 1G cellphone with Internet connection can be used with text-based e-mail software. With the development of graphic-based e-mail software, however, text-based options are not commonly available.
3) *Online question-and-answer polling* software has been available since the 1990s. Many students answer multiple-choice, interval, or ranking questions. In the basic asynchronous Q&A polling

TABLE 4.1. Twelve levels of educational media interactivity

Capability of interactive software				Hand units	PC + Internet	Cell-phone		Cell + other media
Levels		Students	Teacher			1G	3G	
1	Browsing (asynch)	One	No	n.a.	Yes	No	Yes	n.a.
2	E-mail (asynch)	One	Yes	n.a.	Yes	Yes	Yes	n.a.
3	Q&A: no feedback (asynch)	Many	No	Yes	Yes	SMS	Yes	Viable
4	Real-time polling (asynch)	Many	Maybe	Yes	Yes	Yes	Yes	Viable
5	Text forums (asynch)	Many	Yes	n.a.	Yes	No	Yes	Viable
6	Text chats (synch)	Many	Yes	n.a.	Yes	Yes	Yes	Viable
7	A/V-conferencing (synch)	Many	Yes	n.a.	Yes	Audio	Yes	Viable
8	Q&A: feedback (synch)	Many	Maybe	Yes	Yes	Yes	Yes	Viable
9	Collaborative activities	Many	Yes	Yes	Yes	No	Yes	Viable
10	Real-time CRM (asynch, no feedback)	Many	No	Yes	Yes	Viable	Viable	Viable
11	Real-time CRM (synch, no feedback)	Many	No	Yes	Yes	Viable	Viable	Viable
12	Real-time CRM (synch, feedback)	Many	Yes	Yes	Viable	Viable	Viable	Viable

KEY:

Asynch	Asynchronous (not real-time, delayed interaction)
Synch	Synchronous (real-time interaction)
1G	1st general cellphones (text only)
3G	3rd-generation cellphones (text and graphics)
SMS	Short message service (cellphone texting)
A/V	Audio and/or video
No	Useful software not conceivable for this technology
Yes	Useful software available for this technology
Viable	Useful software could be created for this technology
n.a.	Not appropriate or relevant to this technology

situation, no teacher is in evidence for the students receive no feedback about the polling results. The same results can be yielded by SMS methods on the 1G cellphone.

4) *Real-time polling of audience responses* to a recorded presentation were commonly used in 'programmed instruction' research from the 1950s to '70s, in order to find ways to improve the instruction. Responses could be collected from many respondents in classrooms or focus groups, and analysed subsequently with or without feedback to the respondents.
5) A higher level of interactivity occurs when the teacher is able to communicate via text-based messages with many students asynchronously as in *online text-conferences and blogs.* If all respondents are not simultaneously present, responses are delayed. The displays are not usually possible on a 1G cellphone, though are possible in text/graphics on a 3G cellphone.
6) Synchronous text-based software allows a teacher and many students to interact in real-time via *live text-chat boxes.* Basic text-chat software has been available for computers with Internet connection since the 1990s. As long as graphic displays are not involved, 1G and 3G cellphones can be used. Text with graphics displays require 3G phones.
7) The combination of *real-time audio and/or video with text-conferencing* allows two-way interaction between the teacher and one student at a time, and one-way presentations by a teacher or student to many participants at once. Real-time text-chat boxes are commonly added to A/V conferencing software, and can be useful in conference coordination.
8) The *software for synchronous question-and-answer polling* is usually the same as at Level 3), with extra routines for instant analysis and feedback of results to the respondent(s). Students answer multiple-choice, interval, or ranking questions, and feedback is given either by automated routines or by a teacher instantly interpreting the results.
9) Combinations of these interactive methods (e.g. web browsing, e-mail, live text chatting, Q&A polling, A/V and text-conferencing, blogs, and other collaborative activities) are used in *social networking packages,* providing options for asynchronous or synchronous interaction as appropriate. These packages are commonly labelled 'Web 2.0'.
10) *Systems for moment-by-moment real-time polling* (continuous response measurement,) have been used in media and advertising research since the 1940s. PC software has been available since the 1980s. Hand-units, web-based, and/or cellphone keypads can be used to collect audience responses, as in formative evaluation studies where feedback is not essential.
11) When *continuous responses to a live presentation* are collected (e.g. a TV broadcast or a lecture), the teacher can react tacitly to an instant analysis of the responses in varying the presentation in real time. For example, if students give continuous responses showing failure to understand the lecture at specific moments, the teacher can repeat or clarify related points.
12) The highest level of interactivity occurs when *continuous responses are instantly analysed* and the results fed back to the students as well as the teacher. The students can compare their responses

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with those of other students, and the teacher can improvise with follow-up questions, comparing new responses with prior data in order to gain insights into subgroups' responses.

Viability of new interactive software

The shaded cells in Table 4.1, labelled 'Viable', indicate the viability of numerous interactive applications of the traditional and modern educational media not yet developed. The real-time polling applications of political and advertising research have used customised hand-unit technologies only (Millard, 1992). The same techniques can now be developed for the Internet and cellphone (Figures 4.1 to 4.3). Many of these data collection methods are already readily available on the 3G cellphone, owing to its ability to connect to the Internet via wireless connections rather than through Internet providers. In developing countries, however, the 1G cellphone will remain the most accessible medium for the foreseeable future[1]. This is a major reason for real-time software development for the 1G, text-only cellphone, and for software permitting 1G and 3G cellphones to function in hybrid contexts with other media (e.g. TV). The potential of these techniques in social science research is immense, though requires carefully designed psychometric data collection techniques and cautious statistical analysis overcoming reliability and validity problems in the data (Baggaley, 1987, 1997).

Conclusions

The techniques are available to render any educational medium totally interactive. Using the cellphone to collect real-time responses to live and recorded presentations, the teacher can collect and analyse students' responses on a moment-

Fig. 4.1. A hand-held keypad used to collect real-time data from farmers in tribal Kenya (Baggaley,1997).

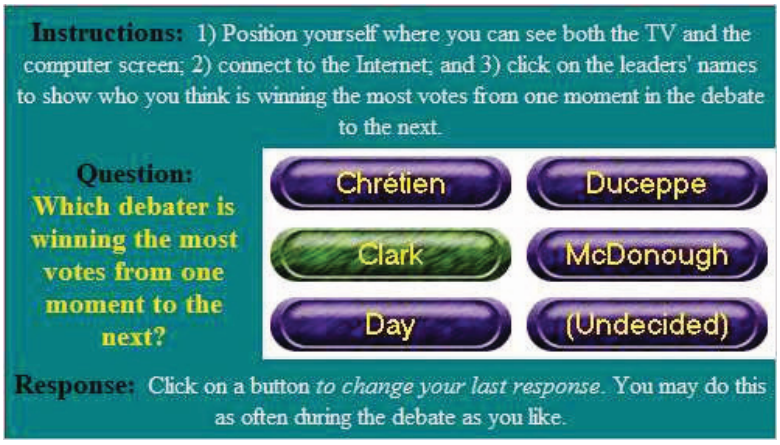

Fig. 4.2. A web-based key-pad used to collect real-time responses to a TV political debate (Baggaley, 2000).

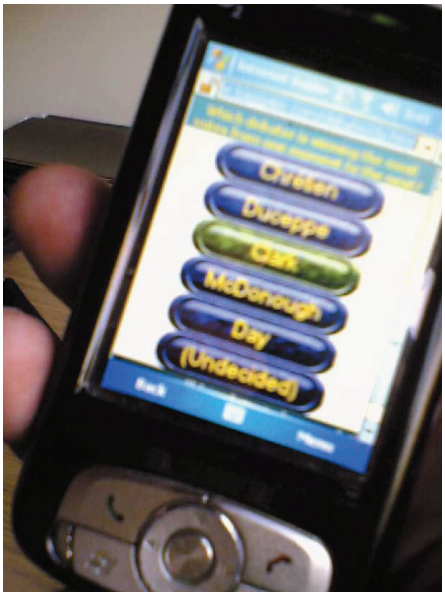

Fig. 4.3. A 3G cellphone version of Fig. 4.2.

by-moment basis, provide them with instant feedback of results, vary the presentation according to student feedback, and generate follow-up questions and materials. The result is a continuous, two-way feedback loop between the teacher and many students simultaneously, not possible in aural communication. Such systems can overcome the common criticism that media-dependent (e.g. distance) education lacks teacher-student interactivity.

Note

1 An Ernst & Young report (November 2008) predicts 30 million 3G users in India by 2012, with the remaining 99.98 % of the population lacking a phone (40%) or having a landline or 1G cellphone.

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