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Teacher generated research in educational technology

Suzanne McNamara
Hawthorn Institute of Education

A growing number of teachers with little or no expertise in educational technology are becoming involved with technology in the classroom. Consequently there is an increasing awareness by teachers of the need to examine the facilities and effectiveness of the technology. The purpose of this article is to illustrate the potential of teacher generated research in educational technology.

The classroom might be described as a myriad of factors which affect learning. The classroom teacher is in the unique position of being able to control and/or manipulate many of these factors. It is the teacher who determines the role of technology (educational) in the classroom and thus, directly or indirectly, its effectiveness. Even in an individualised situation much of the responsibility for the ultimate success of the instruction lies with the teacher, in terms of selection of appropriate media, hardware, materials and in the organisation of the instructional situation. Classroom investigations undertaken by teachers therefore can provide valuable insights into, and information about, educational technology.

The studies discussed in this article were a part of a series of investigations conducted as small scale research projects by teachers from various specialist areas within the educational field. Many had little or no prior research background, nor had they previous experience apart from classroom involvement, with educational technology. The infinite variation in the use and function of educational technology is witnessed by the variety of topics and problems teachers chose to pursue. Studies varied from examination of the role of teachers in conjunction with technology to investigations of the specific attributes of a particular medium.

Technology and teachers as presenters

Brown (1985) examined the use of commercially prepared videotapes and teacher presentations in a study concerned with the teaching of communications skills within the hospitality industry. Cordon (1985) focused on teacher use of graphic symbolism in the teaching of practical electronics experimental procedures. Edwards (1985a) considered the potential of video in terms of the efficiency of a recorded teacher demonstration when compared to classroom time spent in actual demonstration by the teacher. Each of these studies shared the characteristic of direct teacher involvement with technology and each provided some insight into the relationship between teacher and technology.

Technology attributes

In contrast to the above, Gibson (1985) and Waterson (1985) selected the technical characteristic of colour in relation to separate media and differing fields of specialisation. Although studies concerning colour were found to be numerous in the literature, little evidence was found of the use of colour in relation to trade studies. Gibson's study looked at the use of colour per se, as opposed to black and white, in both slide and print formats in programs about machinery operation. From his study Gibson noted that, in relation to machinery component identification, the use of neutral background colours facilitated greater identification than the more stark contrasts found in black and white photographic representations. Waterson (1985) focused his investigation on the overhead projector and the use of colour cued transparency diagrams in electrical/electronic practices. Finding little difference in performance his study did serve to point to the quality of the transparency as a most important factor in determining its success.

Although perhaps not earth shattering in their findings, these studies do offer some food for thought. Each goes beyond the surface use of technology and serves to remind us of factors often forgotten or not recognised, particularly in the case of the non-specialist education technology user. It is the teacher's use of the technology which makes it an integral part of the learning process. For the non-specialist designer preparing programs using photographic representations, just taking the photograph is not enough, and many an instructor might feel a twinge of guilt when reminded of the time he/she has used a somewhat inappropriate or cluttered transparency which confused more than it clarified. Reading 'guidelines for construction' or 'pitfalls for the unwary' does not impart the same reaction nor understanding as that put forward by the discovery learning in a research project.

Yeats (1985), utilising the discovery learning methodology concluded that such a methodology, with regard to the concepts involved in the learning of fluid power, required that students satisfy the pre-requisites of familiarity with relevant facts before embarking on a 'discovery journey'.

Whilst the limitations of small scale research must be acknowledged, the benefits to the teacher are undeniable. Within the daily routine of the classroom many instructional opportunities pass unnoticed or untapped. The creation of an increased awareness of the classroom environment through the conduct of a study, might serve to improve classroom interaction and subsequent learning. Even the most common, if underrated of technologies - print - has been given greater consideration through better understanding gained by investigation.

Investigations of print

Kinnersley (1985) took as the subject of his investigation the humble data table found in component manufacturer's catalogues for bearings, valves and other components. In a simple adaptation, he incorporated horizontal sight lines in order to facilitate easier reading. A second version used a blocking technique comprising both horizontal and vertical lines to block sections of the table. The results of this investigation were in favour of the use of single horizontal lines, the blocking being found to be less effective. Although, in essence, a simple procedure, it is one which, to date, has been largely overlooked in the production of such catalogues.

In further studies focusing on the use of printed materials Jones (1985) and McNish (1985) examined the relationship between the written word and diagrammatic form. Jones (1985) examined the usefulness of step by step written instructions in relation to a construction task usually undertaken using only diagrammatic instructions. He found students required far less teacher assistance on the task and that the resulting lack of interruptions facilitated more efficient learning time. McNish (1985) used a reverse procedure. His study incorporated line diagrams in materials which were generally given only in written text form. Again fewer difficulties with the task and a higher correct response rate were found. Focusing more closely on the form of the written word within the printing industry, Magnik (1985) compared two forms of lettering, typewritten and typeset. As was expected student preference was for the typeset notes which were considered more aesthetically pleasing and were found to have a greater positive and motivational appeal. No differences were found in performance however. This finding suggested that preference may not determine performance, particularly in adult learners.

Motion

Further studies have focused on the specific attributes of other media. Edwards (1985b) and David (1985) both dealt with the use of motion as an instructional technique. Edwards (1985b) related motion to the requirements of demonstrations of large scale machinery for students unable to examine the 'real' thing in the field. David examined the relationship between content information and the use of motion.

Relationships with industry

Other studies have served to involve the wider areas of industry in investigations concerning educational technology. Noke (1985) conducted an evaluation of a package entitled 'Bevel Gearing for Pattern-making'. One of the outcomes of this study was to strengthen the relationship between industry and trade education by involving industry more directly in the development and processes of trade training. Hoskens (1985) involved careers teachers, employers and prospective employees (school leavers) in his study which incorporated an examination of the role of career brochures in employer/prospective employees perceptions of the job seeking process. As with the above study, this investigation related the use of technology to a wider field, in this case the job seeking process.

Instructional design

A further aspect of educational technology examined in teacher generated research studies has been in the direction of instructional design. Calderan (1985) and Summers (1985) concentrated on the provision of adequate information for students in the light of their prior experiences. Calderan dealt with information in an instructional pamphlet used in the printing industry, while Summers concentrated on a task requiring the drawing of orthographic scale drawings within the furniture industry. Both found students' prior experiences to be a determining factor in performance and investigated means, which could be incorporated into the design of materials, of overcoming differences in student prior experience.

Bastow (1985) examined the use of knowledge corrected responses in relation to the use of individualised programmed materials, and found not only did the use of this type of feedback enhance learning, but that in adult students, performance was also strongly influenced by motivation. Kernaghan (1985) also investigating the potential of feedback, endeavoured to determine the effectiveness of delayed feedback as opposed to immediate feedback on student test performance in a technical area of study. Two equivalent groups were used in the study, the variable being the timing of feedback. Three separate tests were given to students, superior performances being found on the third test for students provided with delayed feedback. Similarly, Crebbin (1985) examined immediate and delayed testing in relation to a pre-driver education course and found smaller segment presentations followed by immediate testing to be of greater value to students than large segments followed by delayed testing. Using a video format as the vehicle of instruction Kaiser (1985) also examined the sequencing of information in relation to a unit of instruction in a hairdressing course. He found that, in the context of this task too, short sequences of instruction followed by review techniques were superior to longer sequences.

Learner characteristics and technology

Finally teachers have begun to examine the relationship between learner variables and the characteristics of the various technologies. Banham (1985) incorporated measures of student vocabulary and comprehension in a study of the effects of three commonly used media: print (flip cards), slide/tape and video. Similarly Bird and Gill (1985) examined the interaction of the learner's cognitive style (visual/haptic) with the means of presentation (interactive computer/print) in an examination of a comparative visual/graphics based task.

Conclusion

As previously mentioned the limitations of small scale research must be taken into consideration. With this in mind though, the involvement of teachers from all aspects of the educational field in examination of the potential of the various technologies in their specific fields of expertise, can only serve to assist in improving the understanding and applications of the technology. The potential of technology might be almost infinite, but its success depends to a large extent on the role given it by the teacher and it might be suggested therefore that in teacher generated research lies the future role of educational technology in the classroom.

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