

A Systemic Approach to Digital Image Recording in Technical Education

Abstract

Digital image recording is becoming commonplace in modern life. This article describes current pedagogical research aimed at the use of visual recordings obtained using the digital technology CCD (Charge Coupled Device) for technical instruction at junior schools. The author begins by presupposing that visual recordings will range into a format that, when used during instruction, will operate on student receptivity in a new way and influence the effectiveness of technical teaching.

Keywords: *digital image recording – CCD – technical training – pedagogical research – factor rotation method – visual structures*

The penetration into daily life by digital broadcasts of pictorial information and data is a distinct phenomenon today. We regularly encounter digital images provided by CCD (Charge Coupled Device) on the internet and in digital photography, whether separately or integrated into mobile phones or television broadcasting, etc. The image, processed and transferred across various types of media, serves not only as a means of mutual communication, but is used as a source of fun. Philosophically it has been expressed, ‘the picture not only depicts reality – the world itself becomes a picture’, or elsewhere, ‘many prefer the screen to reality’ (Pondělíček; 2000, 385)*. In these ways visual communication reaches the world of education and training.

Pedagogical theory must legitimately represent this phenomenon, because the digital recording of an image enables its relatively easy adaptation to conditions in the current education system. Every medium, including the education system, has

* Epilogue from McLuhan, M. H. *Člověk média a elektronická kultura*. Trans. Irena Příbylová. Nakladatelství Jota, 2000.

its characteristic arrangement of information, which works upon our perception. There is a question, in which way and in what form schools will absorb this information. Marshall McLuhan coined the phrase, 'the medium is the message.'

The digital notation of pictorial phenomena into a pictorial matrix using a CCD chip is the principle of digital image recording. It is possible to define digital image recording as an educational construct used in teaching – as the communication medium between teacher and pupil. This method of recording pictorial information allows us to acquire and process pictures, and thus their relatively rapid integration into teaching.

Digital image recording is the output of a series of processes, and to produce it one must first follow a whole creative process. It is characteristic that it is coupled with real phenomena and material objects. If we want to compare this method of communication with the classic verbal method, we recognise that it is an utterly different way of perceiving information. The word (*logos*) has in written culture its importance in the generalisation of reality. In contrast, the picture recorded using the CCD chip, be it in digital camcorders or cameras, has an entirely concrete character. We now encounter the expression "thinking of visual perceptions" (Pondělíček; 2000, pg. 387)*

It is necessary to realise that the children we now teach are already adapted to the medium of television broadcasting, with all its negative results. Many authors, N. Postman among them, maintain that television and popular science programmes, including game shows based on an encyclopaedic knowledge, evidently cannot be considered as serious education, as the criterion of television broadcasting is predominantly rating and satisfying the public. On the other hand, learning is a demanding subject and it requires more from the pupil than just having fun. 'Children long to inhale knowledge deeply, and never for linearly separated, consecutively arranged schemata. Their natural instinct, formed by the electronic media leads them to focus all their senses on the book they must read. The printed word however, resolutely resists this approach, demanding as it does an isolated visual relationship, rather than the holistic approach of a sensoric appliance' (McLuhan, 2000, p. 230). 'Televisual communication' with the audience demands that the 'principle of dynamic storytelling must be enforced to the maximum, thus it approaches extremely closely the ideal of the good teacher who, 'merely tells a story' to his or her students. Teaching using television imagery, whether in popular science programmes or general knowledge quizzes, suffers a certain uniformity and modesty of ambition from the educational standpoint. Educational

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programmes presented with the use of visual media are, as a rule, designed to attract and amuse the viewer, and are understandably meant for the broadest section of the population.

Meta-analysis conducted by George Comstock (2800 studies) on the influence of television on human behaviour failed to establish that the level of teaching success rose if presented in a dramatic context.

Investigations by, for example, Cohen, Salomon and others, found that a mere 3.5 percent of viewers successfully answered 12 questions covering two half minute excerpts of advertisements and programmes from commercial television. Katz has observed the fact that 21 percent of viewers are unable to recall a single piece of information an hour after broadcast. Watching television does not significantly increase the success of learning, and its share in strengthening deductive thinking is even smaller (Postmen; 1985).

In my opinion, the area of technical education is the only area in education where digital image recordings can be used effectively. In teaching technology, the image recording can serve as a method for displaying new subject matter, and likewise as a diagnostic tool. In my work I use digital image recordings to illustrate the technical approach of simple industrial subjects, about which the students are learning the basis of technical procedures. The use of DVD images is relatively easily incorporated into the lesson by use of a data projector. The experience with screening educational programmes in teaching, however, is to detach the teacher from his or her leadership role in education, and pupils are very often inappropriately distracted by various misleading effects intended to make studying more attractive. For this reason it is often advisable to alter the visual recording in such a way that enables the teacher to keep his or her role as leader of the syllabus intact. In this way, the modified recording forces the student to focus on the essential problems of interpretation.

Systemic approach to DIR

Whilst the tendency so far has been to adapt teaching to visual recordings, the digital visual recording enables us to adapt visual recordings to teaching.

Let us try and take a look at digital image recording (hereafter DIR) systemically. This means looking at its structure, analysing its specifications, its preparation and design stages and so on.

The results – stemming from the hitherto lack of a systemic approach to DIR, have led to a state whose characteristics are:

- a disjuncture between the theories of pedagogical process and DIR;

- DIR being underrated in teaching;
- the marginalization of several factors in DIR, especially the inclination towards 'fun' presentations of DIR with no pedagogical link;
- a lack of prediction with regard to the modern trends in presentation by visual recordings, to inter-personal communications at the expense of spoken and written communication.

Functions of DIR

If we look more closely at the adaptation of DIR in technological and educational practice, we can isolate the following factors:

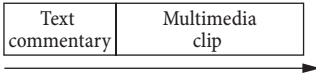
- The communicative function of DIR as a communication medium, which provides for the transfer of visual information.
- The identification function – the DIR asserts the causes operating upon an object. It identifies the cause of given phenomena. The DIR is an algorithm according to which it is possible to solve similar tasks. The recording thus generalizes and integrates the main principles of the phenomena.
- The prognostic function of DIR is invoked, when on the basis of similar phenomena we can judge the effect of an activated quantity. On the basis of the visually presented reality, the student predicts the possible results of the phenomena or activity.
- Its diagnostic function consists in the use of DIR to diagnose knowledge; it allows the possibility for working with mistakes, demonstrating incorrect solutions, solving problems using the black box method, or open-ended solutions by prematurely stopping the recording.
- A demonstration function expresses and interprets phenomena and objects. It illustrates the definition of a concept and functions as a vivid demonstration aid.
- The psychological function influences students' style of learning; it objectifies changes in students' approach to learning.
- Documentary and archive functions.

In my work I am concerned with the following phenomena.

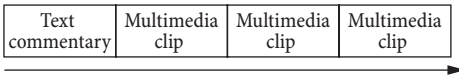
1. The structures of DIR according to their interior arrangement.
2. The structures of DIR according to their exterior arrangement.
3. The designation of crucial links in the transformation of a kinetic recording into a static one.
4. The effectiveness of individual formats and their use in education.

The visual recording can be divided into basic structures.

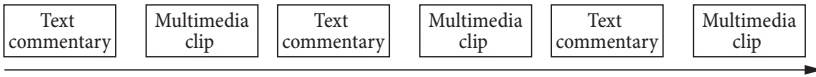
1. Continual kinetic visual recording



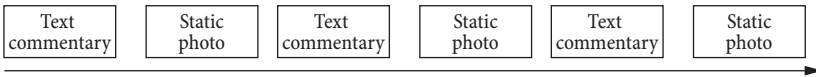
2. Shortened kinetic visual recording.



3. Sequential kinetic visual recordings with commentary

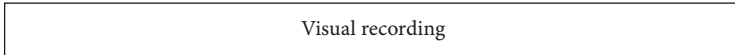


4. Static visual recordings with text commentary

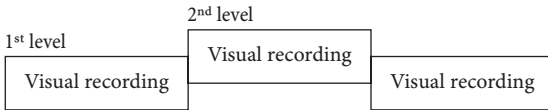


Basic structures of internally arranged visual recordings.

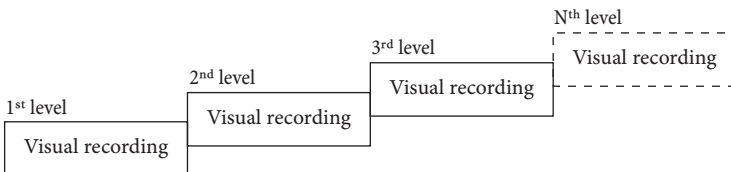
1. Continual kinetic visual recording



2. Double-level (branched) visual recording



3. Multi-level visual recording



The internal arrangement of visual recordings presents the structure found in the content of the communication. The structure unfolds from the complexity of the subject, being dependent on interactions with technical systems and phenomena.

In the research the functionality of individual structures of visual recordings on pupils at junior schools is tested, and it will ascertain the perceptual differences between individual structures. I will conduct the research using the factor rotational method. I will assume that the use of a data projector and a DVD creates conditions comparative enough for valid and reliable results to the research. My own recordings of technological processes and also the digital recordings of other authors will form the content of the visual recordings. The length of individual recordings will not exceed 10 minutes. Visual recordings have been taken by camcorder and further processed into such a graphic setting that, accompanying subtitles, backgrounds and format are identical for the various forms of static and filmed presentations.

The rotation of factors is exercised from the standpoint of how the presented themes are ordered, as well as the presented forms. The research is conducted at two levels, firstly an investigation by questionnaire of the quality of students' visual perception and their evaluation of the effectiveness of the teaching. The second layer is focused on the teacher as the employer of visual presentations. The influence of visual recordings on students' technical literacy and also the examination of the possible diagnostic function of visual recordings in technical education will form part of the research.

Bibliography:

- McLuhan, M. H., (2000): *Člověk média a elektronická kultura*. Trans. Irena Příbylová. Nakladatelství Jota.
- Postman, N.: *Amusing ourselves to death*. Published by arrangement with Viking Penguin, a division of Penguin Putnam Inc.
- Říčan P. Pithartová D., (1995): *Krotíme obrazovku. Jak vést děti k rozumnému používání médií*. Prague: Portál.
- STERNBERG, R. J., (2002): *Kognitivní psychologie*. Překlad Koukolík F., Benák, R., Břejlová, D., Foltýn J. Portál.
- Mareš, J., (1998): *Styly učení žáků a studentů*. Portál.
- Mareš J., Křivohlavý J., (1990): *Sociální a pedagogická komunikace ve škole*. Prague: SPN.