

## Multimedia presentations for didactic and research purposes

**Waldemar Marzęcki**

West-Pomeranian University of Technology in Szczecin  
Szczecin, Poland

**ABSTRACT:** Discussed in this article is the way in which multimedia shows may be adapted for didactics and research. First, a study is presented on students' interest in multimedia lectures. Next is demonstrated the method of creating contemporary narration using scenarios of the emotional structure of the show, hierarchy of transitions, as well as graphics and sound. The transitions between slides, animation sequences and the original character of multimedia presentations are also presented and discussed. Deliberated also is the role of multimedia presentations in didactics and research.

**Keywords:** Multimedia, contemporary narration, hierarchy of transitions, multimedia software, visual means and sound

### INTRODUCTION

There has been a revolution in displaying presentations. Forgotten are projectors that used photographic film. Today, computer-generated presentations use multimedia software, which has become a global standard. It is natural that new audio-visual technologies have caused fundamental changes in the aesthetics and language of visual narrations. However, based on many years of observation, both of teaching and in scientific circles, this technological progress has not led to a widespread change in the style of presentation.

At scientific conferences or in classes staff deploy modern computer projectors or interactive monitors to display presentations that do not differ materially from archaic slide shows. This results in a significant weakening of the role that presentation can play in didactics and research.

There are many programs that enable realisation of highly complicated multimedia presentations [1]. Among them are programs for professional work and for amateurs; programs are available and easier to use. Creating a multimedia show is possible even for amateurs. Technical problems are no longer an obstacle to achieving a good result, but there is a need to create scenarios for the multimedia message.

### MULTIMEDIA PRESENTATIONS

One of the most important expectations for multimedia shows is that they will be more useful in didactics and research than are traditional presentations. Multimedia presentations proposed in this article are based on the author's experience in preparing presentations for lectures, photographic exhibitions and scientific presentations. The material is supported by the results of research on multimedia presentations. Most of the study was empirical. In the observation phase, the imperfection of traditional methods became apparent. The experimental phase consisted of many years of constructing various forms of multimedia shows with technical and emotional means of expression. In the verification phase, selected multimedia shows were checked for their effectiveness by means of surveys.

Presented in this article are the results of a survey concerning the level of viewers' interest in fragments of a multimedia lecture. The survey was carried out among students during a lecture on computer animation and film. The lecture was divided into 11 thematically coherent parts. After watching and listening to each of these parts, the students assessed the

degree of interest in the knowledge transmitted on a scale of 1-10. Special slides identified the start and end of the survey. Each partial questionnaire lasted seven seconds. Students filled in the questionnaires without disturbing the lecture. The data obtained in the survey were analysed with quantitative, qualitative and numerical matching techniques. The survey was overseen by a 28-person group of the second-year students of architecture at the Master's degree level in urban design. The results are presented in Figure 1.

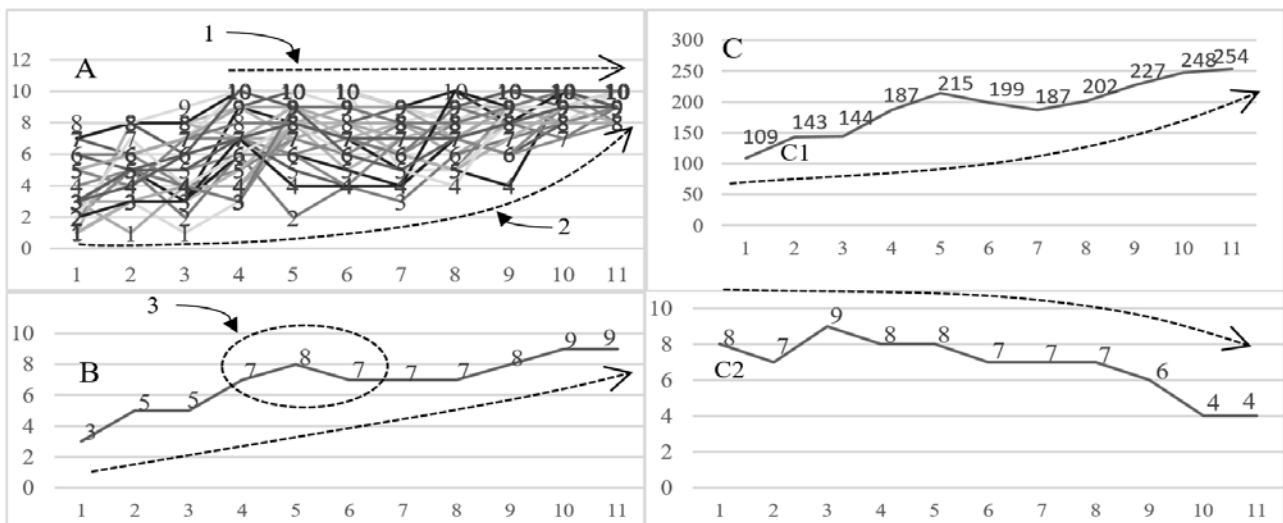


Figure 1: Survey of interest in consecutive fragments of a multimedia lecture; A - summary score of all lecture sequences; B - median of marks for individual lecture sequences; C - juxtaposition of two curves; C1 - summary score of individual lecture sequences; and C2 - degree of scoring discrepancies of individual lecture sequences (Source: Author).

The results are presented in three graphs. The A-graph was created by superimposing the results of all questionnaires. The values correspond to the degree of interest of the listeners in the 11 fragments of the lecture.

The following conclusions can be drawn: after the initial divergent assessment of the first three parts of the lecture, the listeners appeared to assess the lecture as positive; this trend, apart from one deviation, was maintained until the end of the lecture (Figure 1, line 1). There is a systematic decrease of the differences in the evaluation of individual fragments of the lecture, with a simultaneous increase in its scoring (Figure 1 line 2).

The second diagram B shows the median of results presented in diagram A. This graph also confirms a clear trend of increasing interest in the lecture, from the average level of three points to an almost maximum level of nine points.

The last chart C is a juxtaposition of two curves; the top illustrates the total score from the evaluation of individual parts of the lecture (Figure 1, C1), the bottom is the number of divergent marks in chart A (Figure 1, C2). The analysis of both graphs shows that the degree of interest in the lecture systematically increased, while at the same time there was a reduction in evaluation discrepancies.

The research and experience in preparing presentations for didactic and research needs is published below. Proposed is the application of *scenarios of the emotional structure of the show*, the hierarchy of transitions, graphics, sound and the original character of the multimedia show.

## CONSTRUCTION OF A MULTIMEDIA SHOW

### Emotional Structure of a Multimedia Show

The most important component of any presentation is its content. However, the limited size of this article means the content is not discussed in detail. Researchers and educators usually seek to maximise the amount of information. Many speakers, because of the belief that the form of presentation is secondary to the substantive message, marginalise the importance of the former [2]. In this article are discussed some aspects of constructing multimedia presentations based on the author's experience. One of the most important elements in the structure of a multimedia presentation is the *scenario*.

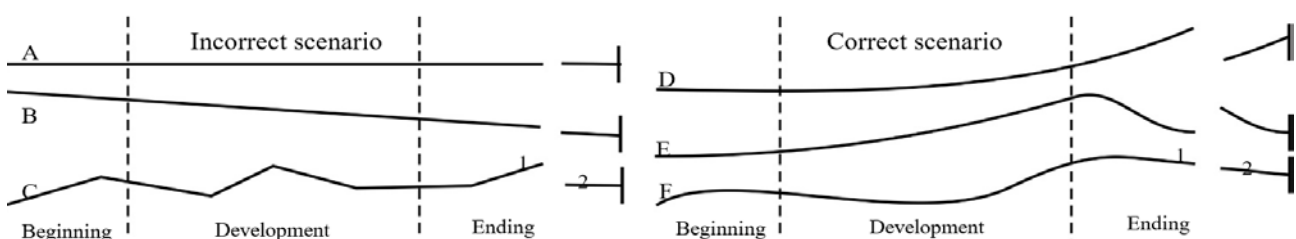


Figure 2: Example scenarios of the structure of a multimedia show (Source: Author).

In Figure 2 some *scenarios of the emotional structure* of a multimedia presentation are presented in a schematic way. They are illustrated by relevant straight lines or curves.

The illustration of the emotional structure of presentation scenarios should be treated only as a subset of possible cases. The graphs divide presentations into regions only and do not indicate the actual duration of a presentation. The slopes of a curve only symbolically illustrate the distribution of emotional accents of the presentation. The presentation was divided into beginning, development and end. In addition, the scenarios were divided into incorrect (A, B and C) and correct (D, E and F) distribution of emotional accents in the multimedia presentation.

Line A illustrates a presentation in which the lecturer just transfers information dryly without distinguishing any of the parts. It is quite difficult to conduct a lecture so impassively and this model should be treated as hypothetical. Line B illustrates an even more hypothetical situation in which the speaker conducts a lecture so monotonously that it leads the audience to a gradual loss of interest in the message. Line C illustrates a situation in which the emotional diversity of the presentation can be considered positive, but with a highly random distribution of accents that do not build a coherent message. These three presentation scenarios are unacceptable. Line D illustrates a scenario where the interest in the information gradually grows through the presentation culminating in the audience being most interested in, and satisfied with, the presentation. Line E is a modification of Scenario D, where the climax occurs just after the development phase. Such a distribution of accents makes it possible to conclude the lecture calmly at the end of the presentation.

While the previously discussed presentations assume a calm start of the lecture, the scenario illustrated by line F assumes a stronger emphasis at the beginning, a gradual calming in the development zone and a gradual increase when entering the conclusion phase and a calmer conclusion. The theoretical models illustrated with lines D, E and F have one more feature in common. With varying degrees of tension during the lecture, their endings are characterised by a higher level of emotion than at the beginning. Generally speaking, the ending may be a calm, *reflective* summary of the presented material (Figure 1 - 1) or a sudden stop aimed at a strong reaction from the audience (Figure 1 - 2). Probably, there are many scenarios of the emotional course of a presentation. The *scenarios of the emotional structure* should make the presenter consider such options, the articulation of the material and accompanying illustrations. The show should reflect the presenter's careful directing effort in its beginning, development and end.

#### Transition Hierarchy

One of the most important elements of the multimedia show is the construction of individual fragments of the show. They can be defined as a set of motifs, phases and sentences. When translated into the language of the multimedia show, they can be illustrated in the form of the diagram presented in Figure 3. Here, the multimedia show can be divided into components as will now be described.

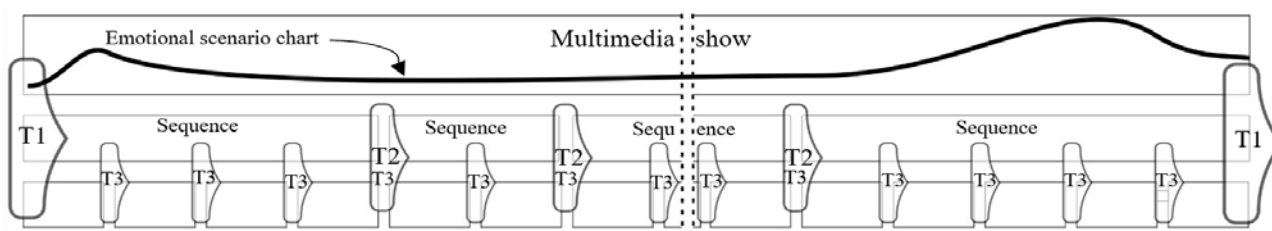


Figure 3: Proposed scheme of construction of the multimedia show, with components and categories of transitions between slides (Source: Author).

The top level, the *multimedia show*, is the whole show. The substantive content of the presentation and the *scenario of the emotional structure* of the planned multimedia show should be determined. A special role in the proposed scheme is played by the *sequences* placed on the second level. Their task is to clearly separate the thematic arguments. At the lowest level in the hierarchy are individual slides. Although they are placed at the lowest level, they play a key role in the show since they contain all textual and graphic information. The role of the *sequences* and the *multimedia show* is to govern the content of the *individual slides*. They form the organisation of the show.

Transitions between slides in a multimedia show play a most important role. There are three categories of transition. The first category consists of two passages marked with T1, as shown in Figure 4. They are to start and finish the whole show. They are dependent on the adopted *scenario of the emotional structure* of a multimedia show. They should use such animations to help achieve the planned scenario effect. For example, it may be a gentle start and end of the presentation or on the contrary, surprising in its artistic and meaningful expression.

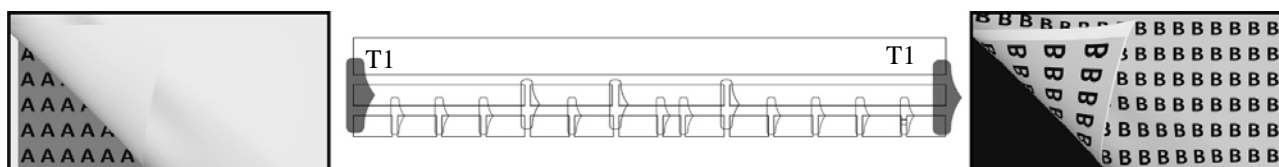


Figure 4: T1 category entrances starting and ending the show on the construction diagram (Source: Author).

Next in the hierarchy of importance are passages marked with T2, shown in Figure 5. Their role in the structure of the show is most important. The task of these transitions is to signal to the viewer that a *sequence* in the discussion of a given issue has started or ended. These transitions should have the following features:

1. Clearly distinguishable throughout the presentation.
2. If possible, identical for transitions between all *sequences*. This is intended to make the viewer accustomed to this as a signal of change in subject or issue.

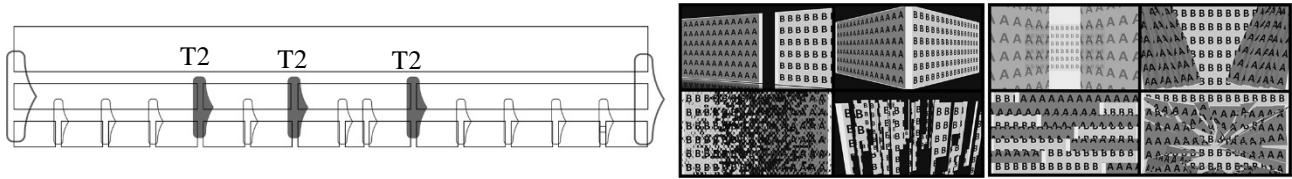


Figure 5: Location of the T2 category transitions starting and ending the individual thematic sequences on a construction diagram (Source: Author).

The final type of transition are the elements marked T3. They are shown in Figure 6. Their basic role is to enable the display of subsequent slides with specific content.

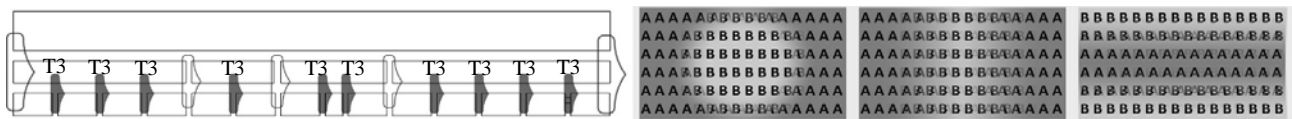


Figure 6: Location of the T3 category transitions on the construction diagram to display the individual slides in the presentation (Source: Author).

T3-type transitions also can be part of an *animation sequence* consisting of thematically and graphically related slides. There are two ways of constructing an animation [3]. The first is to create an animation within a single slide, by means of animation inside the program without applying T3 transitions (see Figure 7A). The second is realised through consecutive sequences of slides connected by type T3 transitions (see Figure 7B).

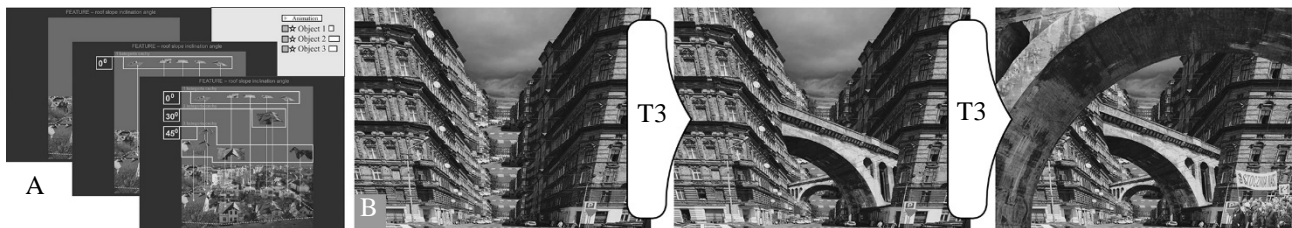


Figure 7: Animations realised by means of keying animations inside one slide A and animations realised by means of consecutive slide sequence B (Source: Author).

In general, it can be assumed that in contrast to T1- and T2-type transitions, T3-type transitions should be of the lowest visual granularity. They should be *discrete* elements of a larger narrative, rather than a self-contained multimedia entity.

## Graphics and Sound

The transitions between individual elements of a multimedia are important. However, the value of the show mainly is determined by the quality of the graphic material [4]. There are several features that that should characterise this material:

- **Graphic consistency** - this can include consciously selected colours, lettering and graphic elements. An example of the conscious use of colour can be a different colour for subtitles in contrast to the colouring of text reflecting the views expressed by the speaker.
- **Legibility** - graphic and text information should be appropriately sized to enable the viewer to read it without difficulty.
- **Terseness and conciseness** - the material should be in the form of specific posters containing a minimum of textual and graphical information, with the aim of supporting, complementing and synthesising the content delivered by the speaker. It is important that the information displayed is synchronised with the speaker's comments. For example, reading *in extenso* a long text contradicts this precept.

Contemporary IT enables the construction of impressive, fully functional multimedia shows. The classic image is no longer the only transmitter of content. The show can be supported by raster and vector graphics or hybrid graphics being

a combination of raster and vector graphics, film and music. All these elements can be mixed digitally. Combining raster and vector graphics can be particularly effective. An example of inserting a hybrid graphic into a film, with animation of camera movement, is shown in Figure 8. This effect could be produced with, for example, After Effects software.

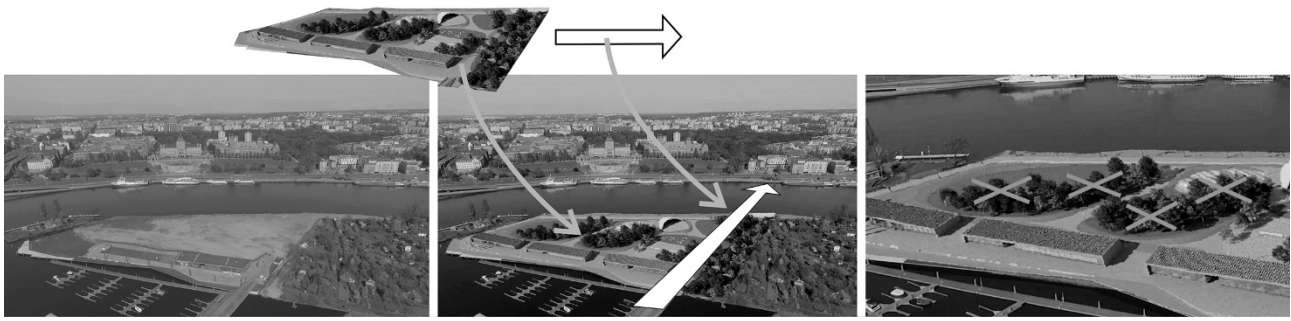


Figure 8: Selected film frames with raster and vector graphics (Source: Author).

Sound can also play a role in a multimedia show. It can improve the message not only as art but also technically [5]. Contemporary multimedia software allows for the seamless co-ordination of the audio and video tracks of a show. During post-production, it is useful to present the audio track as a graph. Graphic image of the sound allows for precise synchronisation of the image with the sound and editing of the soundtrack, even without special skills. Figure 9 shows two video and audio timelines that allow for precise synchronisation of the film and sound with differences in the spectrum image of the sound wave, especially in the attack, sustain and release phases.

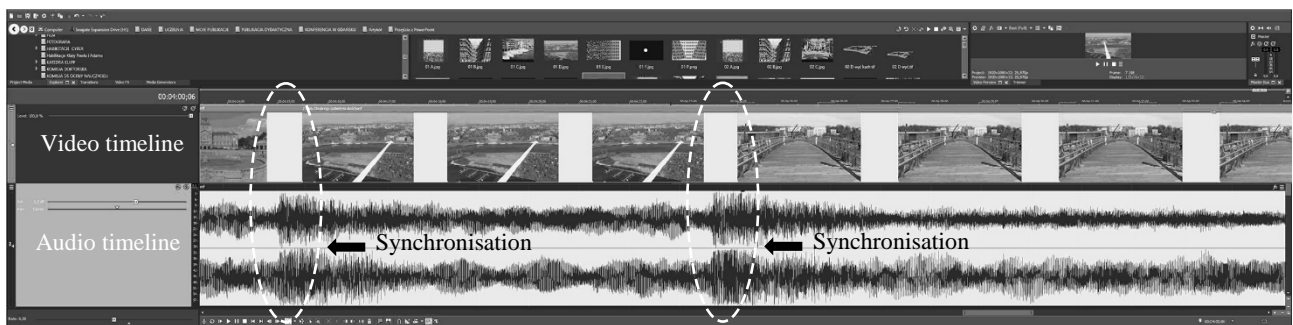


Figure 9: Film and music synchronisation, according to the structure and rhythm of a musical piece (Source: Author).

The enhancement of the show with a sound layer must meet three conditions:

- 1) The sound or piece of music must amplify the content and not just be a random background sound. This should not manifest as the domination of music.
- 2) Individual fragments of a piece of music have to be strictly harmonised with the *emotional scenario of the presentation*.
- 3) The individual sequences of the show and the transitions between the slides have to be precisely harmonised with the rhythm and sequences of the music.

Lack of any of these quantities may cause weakening of the message and, in extreme cases, even disorientation of the audience.

#### The Author's Multimedia Show

Sometimes, it is possible to enrich a show in which film shots create a different *third sense* [6]. One way is to link the graphics with its symbolic meaning. Figure 10 shows the author's sequence of slides, in which initially a white point and then a set of points turn into holes through which is gained *knowledge* from a subjective *point of view*. The association of a point-hole as a graphical sign in connection with a bias of the view can be understood internationally. For example, in Italian, the point of view is *punto di vista*; French, *point de vue*; Spanish, *punto de vista*; Russian, *точка зрения*; and German, *der Standpunkt*; Chinese, 观点. Such subjectivity can be an element in the starting or summarising of a multimedia show.

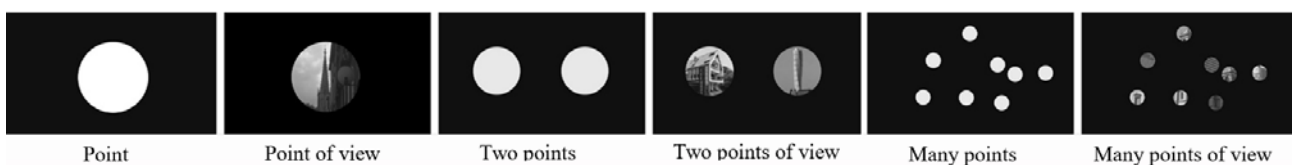


Figure 10: Example of the use of a graphic sign in a multimedia show as a message (Source: Author).

## DISCUSSION

The use of multimedia in didactics has a long tradition. The teaching of foreign languages probably was the earliest use of multimedia in didactics. In 1911/12, the *Phonetic Laboratory* was established at Washington State University. At that time, language laboratories had phonographs; from the 1950s to the 1990s, recorders were used. Information technology has revolutionised language teaching in didactics and research.

In these times of *visual culture*, the way information is conveyed is important [7][8]. Traditional, most often emotionally neutral, transmission of knowledge is ineffective. There should be a more emotional relation between the lecturer and the student. In some cases, following Dubcun's views, something unusual or controversial should be transmitted during classes [9]. However, thanks to the wide use of IT and the *emotional scenarios of the shows*, it is possible to maintain and increase the effectiveness of the information transfer. This is facilitated by the involvement of content through the senses, such as sight and hearing.

A conventional lecture should be transformed into a multimedia show. In such an approach, individualism and sometimes even emotional subjectivity should also be considered. Electronic means of expression must be tailored, whether dealing with knowledge of a scientific or humanistic nature. The borderline is sometimes highly fluid; often, a humorous interlude taken from medieval theatre can have a positive impact on the audience perception of a technical lecture.

Both in research and didactics, presentations serve to convey information to a larger group. There is no difference in interest from students or scientific fora. A lecture often does not deal only with the imaging of relevant information. The construction of a presentation forces the selection of appropriate means of expression, such as graphic diagrams and time sequencing of the narrative. The author submits to a translation of thoughts (ideas) into the visual. The need to present a scientific theory to others can help in its correction.

Multimedia also is associated with many new challenges. Yin reflects on the problem of self-learning skills, self-control and motivation in a multimedia environment [10].

However, despite the risks associated with e-learning and the use of multimedia, their advantages prevail. Lin et al discuss their application at a Technology University in Taiwan [11]. One of the examples is the use of film to explain urban planning problems [12].

An application of multimedia is the UNESCO Digital Library's multimedia video and sound collection. The Massachusetts Institute of Technology has MIT OpenCourseWare as a completely free multimedia platform. Anyone from anywhere can learn by watching lectures and exercises available in traditional or video form; materials also are available to help teachers. OpenCourseWare can be employed without registration.

## CONCLUSIONS

Many years of experience in the preparation of multimedia shows and research lead the author to the following conclusions concerning the construction of multimedia shows for didactics and research purposes:

- In the era of *visual culture*, the traditional slide show is no longer an effective way to convey knowledge.
- A multimedia show should feature creative work.
- A media show without a substantive and emotional scenario is not effective in conveying knowledge.
- A multimedia show must have very carefully selected means of expression relevant to the research or didactic issue (script, graphics, animation, sound).
- The show should be characterised by graphic consistency, legibility and, in most cases, conciseness of the message.
- The display of all elements of the show should be precisely synchronised in time with the speaker's comments.
- A show can verify research by transposing thought (research argument) into the language of a multimedia presentation.

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## BIOGRAPHY



Waldemar Marzęcki is an architect, urban planner and artist photographer. At present, he is a full Professor at West Pomeranian University of Technology in Szczecin, Poland. He is the author of four books on contemporary urban planning, over 90 scientific publications and several dozen architectural and urban planning projects. He is engaged in research on cultural continuity of urban areas subject to modern investment activities. Prof. Marzęcki is a member of the Association of Polish Art Photographers (ZPAF) and the former President of its Szczecin branch. He has authored 43 photographic exhibitions, presented in Austria, Denmark, France, Germany, Italy, the Netherlands, Poland, Portugal and Sweden. In the 70s and 90s, he co-operated with the Szczecin regional channel of Polish Television. In his artistic projects, he combines photography with other fields of art: architecture, urban planning, music, theatre, multimedia graphics, visual art and performance art.