

Two New Concepts in Video Podcasts

Minimalist Slides and Modular Teaching Mini-videos

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Abstract: Nowadays the main learning resources are traditional board, slides and video podcasts. Each of them with their own strengths and weaknesses. Analysing the advantages and disadvantages of the traditional board and slides we have created, with the advantages of both resources, a new concept that we have named “minimalist slides”. Using the minimalist slides we have introduced a new type of video podcast that we have named “modular teaching mini-video”.

1 INTRODUCTION

In today's teaching there are different methods of transmission of knowledge by the teacher: traditional board, slides and video podcasts. Traditional board and slides are well known and are still used. Video podcasts as a learning resource are being used more and more nowadays (Kay, 2012, among others). In many cases, video podcasts are just the recording of entire lectures that are viewed passively (Traphagan et al., 2010; Wieling and Hofman, 2010). Other forms of video podcasts are shorter in time and are associated with interactive tasks to make the learning more effective. For instance, Griffin et al. (2009) used synchronized PowerPoint and voice and He et al. (2012) and Loomes et al. (2002) voice and handwriting.

Each of these methods has strengths and weaknesses. In this work, we analyse the advantages and disadvantages of the traditional board and slides with a survey of students at a Madrid (Spain) university to create, with the advantages of both, a new concept that we have named “minimalist slides” (MSs). With the help of MSs we have created a new type of video podcast that we have called “modular teaching mini-video” (MTM).

The outline of the paper is as follows. In section 2 we analyse the advantages and disadvantages of the traditional board and slides. In section 3 we introduce the MSs and in section 4 the MTMs. In section 5 we propose several rubrics. Finally, we describe some examples of MTMs in section 6.

2 TRADITIONAL BOARD AND SLIDES

In this section, we analyse the strengths and weaknesses of the traditional board and slides with a pilot survey of 18 students studying Statistics in the second year of Engineering at Madrid's Carlos III University. The survey had open questions. We show below similar answers given by the students to each question to have a better general view. Additionally, they were asked to allocate 100 percentage points in total among three methods (blackboard, slides, mixture) according to their preferences for a theoretical class. The results were as follows: a median of 44% for blackboard, 38% for slides and 18% for a mixture.

2.1 Traditional Board

The advantages of the traditional board from the students' viewpoint are:

- It is more dynamic, it forces you to follow the subject and you can customize your class notes.
- You can highlight or emphasize text. The explanations become clearer.
- You can copy the concepts as the teacher explains and thus you have time to understand and make your own notes.
- We have more time to copy. You can solve the problems as you would in an exam.
- It is easier to take class notes.

- Since you have to write, whether you like it or not, you will learn even if you pay little attention.
- The teacher explains more on the board and more of what is on the slides.
- As the teacher explains it is easier to see how the explanation evolves. In my opinion, you take better notes from the board.
- Since the teacher is writing, the student also has time to write in his/her notebook.
- It is less boring and everything is explained a little bit more slowly and you have more time to absorb the explanations.
- You have more possibilities of having all the notes because the teacher can go more slowly.
- There is interactivity. It is easy to give examples.
- It forces the teacher to give an explanation at a moderate speed, allowing the student to copy notes and understand at the same time.

The disadvantages of the traditional board from the students' viewpoint are:

- I would have liked more clarity on the board and a slower explanation.
- It may happen that you cannot understand the teacher's handwriting or that he/she writes too fast and you do not have enough time to copy.
- It slows down the class a bit.
- More copying is required and the pace is slower.
- The teacher has to clean the blackboard often and you cannot go back. The blackboard is messy.
- You may not understand the teacher's explanations because you are trying to copy them.
- The teacher can make mistakes on the blackboard, with illegible handwriting or especially 3D drawings which are difficult to see.
- The teacher is much more messy and disorganized. Sometimes it is difficult to understand what is written and you have to ask him/her.
- You are busier copying than understanding.
- More time is needed to present things such as tables with many data.
- It depends on the teacher's skills to explain himself/herself clearly, in an organized manner on the blackboard.
- It is more difficult to retain all the information if the subject is more elaborate.
- The main disadvantage, that is not always present, is the lack of understanding due to poor lighting conditions or unclear handwriting.

In summary, the strengths of the traditional board are that it brings dynamism, it is easier to take notes, the teacher explains with more examples, it is easier to follow the teacher's explanations because the pace is slower and there is more interactivity.

The weaknesses are that it slows the class a little,

it is more difficult for the teacher to be organized, often he/she does not get a "clean" finish, it is difficult to copy and understand at the same time and the quality of the drawings is not so good.

2.2 Slides

The advantages of the slides from the students' viewpoint are:

- The transfer of knowledge is quicker because the learning content written on the slides is more clear and organized.
- Since you have the slides in advance, you can follow perfectly the explanations.
- The graphical plots are clearer. Besides, the slides provide support to the teacher's explanations and he/she can advance at a convenient speed.
- You do not have to copy.
- They are more visually attractive and facilitate reading. They are better suited for theory.
- They provide clear explanations that help us to learn better.
- Since you already have the slides, it is easier to add your own comments and to follow the teacher's explanations.
- The big advantage is that the quality of the 3D drawings is improved.
- They are easy-to-access material on the web.
- They are useful for us to study for the exams.
- They summarize the concepts and although sometimes there may be information missing that makes the understanding more difficult, though since they contain the most important concepts, you finish the class with a better understanding.
- They are a helpful support for the students when they miss a class.

The disadvantages of the slides from the students' viewpoint are:

- You are more lost because having the slides you write less.
- I do not like the classes with slides because the explanations are not given thoroughly enough.
- The slides are not as your own notes. Besides, you may lose concentration and not take notes of the things that are not included on the slides.
- Sometimes the slides are too summarized. There is missing content.
- Sometimes the content of the slides is not enough and the classes become tedious and too passive.
- If things are not cleared it is more difficult to understand them. Sometimes the explanations go too fast. You do not learn so much.
- As you do not have to copy, sometimes you do not pay attention to them.

- It is a too general and theoretical material when you are asked to solve exercises.
- The explanation is understood less easily than when the teacher explains on the board.
- It may happen that you do not have enough time to add your own comments.
- There is a tendency to go faster (can be annoying).
- The worst way of teaching is with slides.
- They can make the students sleep. Sometimes they are too schematic. It is more difficult to take notes.
- The slides seem to be a comfortable way of teaching for the teacher but very bad for the students because it is very difficult for them to take notes and the teacher usually goes too fast.

In summary, the advantages of the slides are that they are more organized and allow the teacher to go faster, the student does not need to copy, their finish is clean, they can be supplemented with multimedia and graphic support, and they are easily accessible on the web. The disadvantages are that they sometimes allow the teacher to go too fast, they favour a passive attitude, they are often too summarized, the explanations are more concise and there is no space to take notes.

3 MINIMALIST SLIDES

We have seen in the previous section that one advantage of the slides is that the student does not need to write because the slides contain all the information for the student ("maximalist slides"). But this advantage seems to be also a disadvantage for the students because they do not feel the need to write and it causes a passive attitude in them. Even though the teacher can give additional explanations by using his/her voice and/or writing on the board, the student may not pay attention because he/she assumes that explanations not written on the slides are never important. For that reason we propose to use slides with little information on them ("minimalist slides", MSs). MSs are not self-explanatory and force the teacher and the student to work with them. The MSs are used as follows: the teacher provides the MSs on the web previously to the class, the student prints them and takes the MSs to the class, the teacher projects the MSs and writes on them using a digital board to fill them out while the student is copying these notes on his/her printed version of the MSs. Due to the fact that some information is already written on the MSs the student has more time to think as he/she is writing the missing information that is not included on the MSs. This way of proceeding avoids a line being

copied/read by the student without thinking, which would be useless.

The basic features of the MSs are:

- The number of lines on each slide is less than or equal to 7.
- There is space to write on each slide.
- The slides are available to be printed.

After using the MSs during a whole academic year in 40 students of the same subject, they were asked to allocate 100 percentage points in total among three methods (MSs, blackboard, maximalist slides) according to their preferences for a theoretical class. The results were as follows: a median of 80% for MSs, 1% for blackboard, and 19% for maximalist slides.

The MSs have the advantages of the traditional board and slides and do not have the disadvantages of them. The only disadvantage is that they cannot be used in distance learning. This disadvantage will be solved in the new section with the MTMs.

4 MODULAR TEACHING MINI-VIDEOS

In this section, we introduce a new type of video podcast that we have named modular teaching mini-video (MTM). This concept is characterized by its duration, support, methodology, philosophy, format, and interconnection, as explained below.

The duration of an MTM is between 5 and 10 minutes. In order to achieve this duration, an effort of synthesis has to be made and it is necessary to have a structured vision of its content (this is not difficult, but it requires some practice). Nevertheless, we have to remark that "not everything can fit" within an MTM. The MTM is a complement to other traditional teaching materials. The fact of its short duration makes it necessary to prepare the recording and rehearse several times. However, at the same time we have to be practical and to not worry about perfection.

The support in which an MTM is designed are the MSs, described in the previous section.

The methodology that is used in an MTM is based on the digital board, where the MSs are projected and filled in simultaneously. This way of proceeding prevents the passive attitude of students. While watching the MTM the student has to work on each line or drawing that is hand-written by the teacher on the slide. So, first the student has to think what must be filled in on the slide, and then he/she has to write it while he/she is watching the MTM.

Besides, on one hand, the speed of this process is the one that the student needs and, on the other hand, the digital finishing is the one that the student wants. These elements are achieved using the digital board.

The MTMs are based on the following underpinning philosophy: I work (the teacher works) / you work (the student works). We can ask ourselves if the actual teaching will have success or not, both in distance learning and in the classroom (there are not many differences between them: in fact, they are converging). To answer this question we can think of four scenarios, whether the teacher works or not and whether the student works or not. There is only one of these scenarios, where both work, that will have success in the actual teaching. In this scenario, the teacher makes educational material and activities (for example, MTMs) and the student works with them. This philosophy has relevant advantages for the student and the teacher.

The format in which you can view an MTM is on the web (“streaming”) or on a mobile telephone or similar devices (3GP, MP4, etc.). Nevertheless, it is worthwhile to point out that the optimal way of the first viewing is on the computer after printing the MSs, in order to fill them out, following the pace of the digital board. On a second viewing, mobile devices are ideal for reviewing, and this can be done in any place (for example, going to work or to university). With the duration of an MTM being so short, an easy computer processing and an easy search of contents is possible. Besides, there is a real possibility of interchange between students through “bluetooth”. It is necessary that the teacher chooses an adequate size of fonts and elements in an MTM to take into account that the MTM has to be perfectly seen on mobile devices even with small screen sizes. It cannot be said: “Excuse me, I do not know if this line can be perfectly seen”.

The interconnection (or modularity) refers to the fact that the design of an MTM has to take into account that the MTM could be used in several subjects (introductory courses at university, undergraduate or postgraduate levels) taking care also of the accessibility. The short duration of MTMs facilitates their modularity, in contrast to traditional lectures whose long duration do not help to reuse them.

5 RUBRICS

In this section, we propose several rubrics to evaluate the degree of minimalism of the slides that are used in any audio-visual material and the degree

of MTM of any audio-visual material.

5.1 Minimalist Slides

The rubric to assess the degree of minimalism of the slides that are used in any audio-visual material is to give a mini-point for each of the items listed below:

1. The number of slides is less than or equal to 10.
2. The number of lines on each slide is less than or equal to 7.
3. There is space for subtitles.
4. There is space to write on each slide.
5. The upper right corner of each slide is reserved for the small image of the teacher.
6. The bottom right corner of each slide is reserved for the big image of someone doing sign language.
7. There is a slide to make a summary.
8. There is a front cover slide and a back cover slide.
9. The slides are available to be printed.

The final score is to add up these mini-points, multiply by (10/9) to get a 0-10 number. The slides are considered MSs if the final score is bigger than or equal to 8 and scoring at the first and last item.

5.2 Modular Teaching Mini-videos

The rubric to assess the degree of fulfilment of the MTM features of any audio-visual material is to give a mini-point for each of the following items:

1. It is between 5 and 10 minutes.
2. A synthesis effort is observed.
3. The slides are minimalist.
4. There is space for subtitles.
5. The teacher writes on the minimalist slides.
6. You can see well what the teacher writes.
7. A question is formulated that later on is solved.
8. A summary at the end is requested.
9. The written text can be clearly read on a mobile device.
10. The text that the teacher writes at that moment can be clearly read on a mobile device.
11. It can be used in several subjects.
12. The subtitles are available.

The final score is to add up these mini-points, multiply by (10/12) to get a 0-10 number. The audio-visual material is considered an MTM if the final score is bigger than or equal to 8 and scoring at the first and last item.

6 EXAMPLES

In this section, we give some examples of MTMs. To follow completely the explanations on them, it is

required to have a mathematical knowledge equivalent to a student of approximately 14 years old. Nevertheless, the MTMs can be applied to other non-mathematical fields as is indicated in the following subsections. The examples of the MTMs described in this section and their corresponding MSs are available at www.ia.uned.es/minivideos.

6.1 Characteristics of an MTM

In this MTM, the characteristics of an MTM are described in terms of its duration, support, methodology, philosophy, format, and interconnection. In Figure 1a, an “empty” MS (without being filled out) is shown with the characteristics of an MTM. The same MS but “filled in” is shown in Figure 1b at the moment of the recording of the MTM. This MTM shows how to introduce theoretical concepts using an MTM. In this case, having in mind that these concepts were the theoretical concepts of an MTM and they have been explained in MTM format, we could say that it is a meta-MTM. Other examples could be:

- Advice to write (tales, short notes...).
- Hints to enjoy art (painting, cathedrals...).
- Use of the social networks in Education.
- Types of literary works, musical periods...
- The importance of music in films.
- What are the origins of Philosophy?

6.2 False Proof I

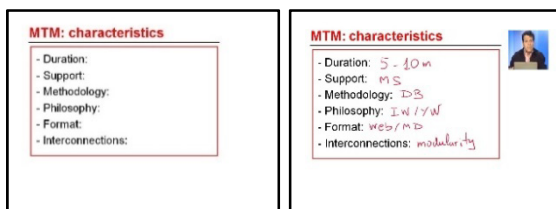


Figure 1: a) Empty MS: characteristics of MTMs (left). b) Filled MS: characteristics of MTMs (right).

In this MTM, one must pay attention to discover the moment when an erroneous reasoning is made in a “proof”. At the end of the MTM the conclusion is an absurdity, specifically that $2=1$. If we are not able to see where the reasoning is incorrect, we will have to accept this absurd conclusion and that would not be reasonable. This is an example of MTM where an erroneous mathematical reasoning is made (although apparently right) to check if the student is able to detect that error. This same idea can be used in other fields. For instance, detect errors when:

- Using languages (English, Latin...).

- Analysing a sentence.
- Classifying a master piece (artwork, music, ...).

6.3 Second Degree Equation

In this MTM, the formula to solve a second degree equation is deduced. This formula is easy to remember and easy to deduce. In the following second degree equation, $ax^2 + bx + c = 0$, it is necessary to assume that $a \neq 0$ as explained in the filled out MS of Figure 2b, associated to the empty MS of Figure 2a, because otherwise the equation would be of first degree rather than of second degree, given by $bx + c = 0$. In Figure 2b, it is indicated that one cannot divide by 0 as has been illustrated in the MTM entitled “False proof I”. This is an example of MTM connected to another (in this case, the MTM entitled “False proof I”). This same idea could be applied in other fields, for instance:

- Latin/English in the Music (Enya, Carl Orff... / The Cranberries, The Smiths...).
- Advice to make text commentaries.

6.4 John and Paul

In this MTM, we are going to solve a very simple riddle about the number of sheep that the shepherds John and Paul have. The riddle is as follows:

I) John tells Paul: "If you give me a sheep, I'll have twice as many sheep as you".

II) “However, if I give one to you, we will have the same number of sheep”.

How many sheep had John at the beginning?

The statement I) is schematically expressed in the empty MS of Figure 3a and its algebraic expression in the filled out MS of Figure 3b. The statement II) is schematically expressed in the empty MS of Figure 4a and its algebraic expression in the filled out MS of Figure 4b. This riddle is solved mathematically in the MTM. However, the purpose of this MTM is to show that it is possible to solve a mathematical exercise through several methods (formal vs. intuitive) and that it is important to choose a good notation to do so. This idea could be

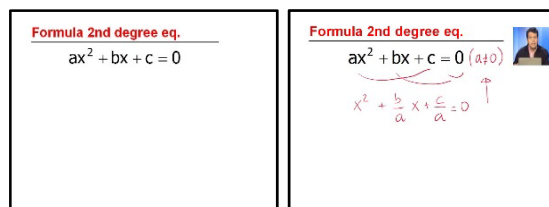


Figure 2: a) Empty MS with first steps of the MTM (left). b) Filled in MS with first steps of the MTM (right).

applied in other areas, for instance:

- To show several solutions of practical cases of criminal law, properly argued.
- To propose several algorithms to solve a specific problem, either mathematical, computational or from the everyday life.
- To implement the same pseudo code using different languages of programming.

6.5 Three Daughters

In this MTM, we solve a very simple riddle although perplexing at first sight. It is about two childhood friends and the ages of the three daughters that one of them has. The riddle is as follows: A man that has three daughters says to one of his childhood friends: "Let's see if you can guess the ages of my three daughters, with the following clues:

- I) "The product of their ages is 36".
- II) "The sum of their ages coincides with the number of the building where we used to wait for each other to go to school together"."

The friend starts thinking and after doing some calculations he says: "Something is missing." The other friend replies:

- III) "Yes, you are right. The oldest is a pianist".

This riddle is solved in the MTM in an exhaustive way, listing all the possible cases for the ages of the three daughters. The objective of this MTM is to show that you must not surrender to a problem that seems intractable at first.

This idea can also be applied in other situations, for instance:

- To describe specific scientific enigmas and how different theories have tried to explain them.
- To solve crimes with the help of forensic science.

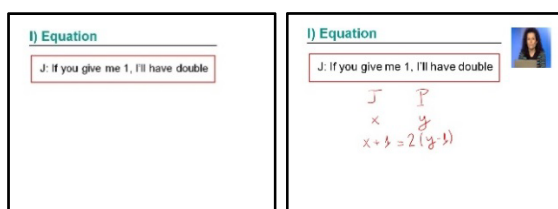


Figure 3: a) Empty MS with the statement I) (left). b) Filled in MS with the statement I) (right).

7 CONCLUSIONS

We have introduced the concept of "minimalist slides" (MSs) which incorporates the advantages of the traditional board and slides and which does not have their disadvantages. The MSs have been incorporated into a new type of video podcast

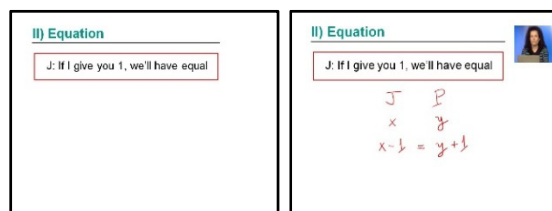


Figure 4: a) Empty MS with the statement II) (left). b) Filled in MS with the statement II) (right).

creating the "modular teaching mini-videos" (MTMs) that inherit the advantages of the MSs with the additional benefit that they can be used at any time and place that the student chooses. We believe that the MTMs will be very useful in the actual teaching covering classroom teaching, blended learning and e-learning. In order to prove this belief we are planning different experiments according to the several characteristics of the MTMs.

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