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SCRIPTING A LESSON: A METHOD TO ASSIST THE DESIGNING OF PERSONALIZED LEARNING ENVIRONMENTS

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1. INTRODUCTION

One of the challenges of teaching is to ensure the learning content is not only meaningful to learners, but also has the desired educational impact on the quality of their learning. All too often, however, carefully crafted teaching/learning materials tend to be presented in such a way that they have limited impact on learners. One explanation for this, is that many teachers feel unable to convert their expert knowledge to the needs of different learners because they do not have the appropriate preparation in integrating teaching tools into their lesson plans.

This paper describes a method to guide the designing of learning environments, based on the work of an interdisciplinary team of researchers and teachers at the *Université de Valenciennes* (France). The first part of the paper discusses research conducted at the University based on a variation of Mumford & Honey's (1992) *Learning Styles Questionnaire* to establish the perceived learning styles of 179 adult learners (Study 1). This is followed by giving the results of a study into learners' self-observation of their dominant learning style (Style 2). The second part of the paper outlines the historical legacy of different pedagogic models *via* six educational paradigms, cross-referenced to nine operational aspects of teaching. To put this analysis in perspective, a study was conducted into the expressed learning modes of 575 adults learning English as a Foreign Language (EFL) (Study 3). This is followed by a comparison of two dominant educational schools of thought, drawn from the work of Piaget and Vygotsky. The third part of the paper explains step by step how to draw up a scripted lesson *via* a series of interconnected pedagogic fragments. To do this we define key concepts such as: lesson, document, hyperdocument, lesson script, diagese, script, scenation, scenic, and setting up the situation. This process is called the scenic approach to lesson planning. Finally, the paper proposes different personalized learning tracks based on two broad types of lesson scripts with their respective advantages and disadvantages in the classroom.

2. FOUR BASIC LEARNING STYLES

There is consensus about the idea that a lesson based essentially on the apparent convenience or fascination for teaching tools is doomed to failure. From an educational point of view, teaching tools are not neutral, if nothing else by the fact, for example, that they depend on the teacher's perceptions of learning styles and what s/he expects of learners in terms of the tools' capabilities. In this light, Mumford & Honey's (1992) questionnaire of styles (*viz. Reflector, Theorizer, Pragmatic and Activist*, see Table 1 below) can help us to help understand what may be going on in the learning process. The advantage of using Mumford & Honey's (1992) questionnaire is its widespread use and cross-curricula application. In practical terms, a dominant learning style represents the likely starting point of how an individual marshals his/her resources. If this initial approach should fail, the learner might then turn to other learning modes.

To put Mumford & Honey's (1992) questionnaire into the context of continuing education, a study of 179 learners (Study 1) of EFL (September – October 2000) filled in a close-ended questionnaire at the *Université de Valenciennes* to establish a four-faceted profile of learners, with each one of the four facets representing a maximum score of 100% each. In this context, of the learners questioned: 70.8% describe themselves as *Reflective*; 67.2% see themselves as *Theorizers*; 66.1 % consider themselves as *Pragmatic*; and 58% perceive themselves as being *Activist*. In short, more than two thirds of the French adult learners asked for a pedagogic structure that allows them time to carefully weigh up the different sides of the question (*Reflective*), followed by

their need to adopt the *Theoriser* (questioning) and *Pragmatic* (“get the instructions-then-do it on your own”) learning modes (see Table 1 below). After having filled in the initial questionnaire, 42 adult EFL learners (TOEIC average score of about 405 points) were personally explained what each of the four learning styles were and then asked to identify explicitly which particular style best described their approach (Study 2). The direct self-report of perceived dominant learning style shows that: 40.5% of learners describe themselves as *Reflective*; 33.5% of learners see themselves as *Pragmatic*; 19% of learners see themselves as *Theorizes*; and 7% of learners see themselves as *Activist*. This study contrasts sharply to the results of the more indirect survey of perceived learning styles of their co-learners (Study 1). The impact of a directive (*jacobine*) and “rationalist” French culture on adult learners’ perceived learning style could be an important factor in explaining the apparent gap between indirect (Study 1) and the more direct self-reports (Study 2).

Reflectors prefer to gather a maximum of data, or think things through, before giving their response. This can include gathering different opinions from others, and observing how other people go about fulfilling a given task. This can make them appear hesitant. They like sharing and learning with others, but tend to overlook the more practical aspects of their insights. The tutor intervenes mainly to suggest appropriate resources and how far learners need to go in their reflection or quest for additional data.

Pragmatics are willing to be shown how to do things, but on the condition that they can immediately put into practice what they have learnt in order to resolve a particular problem. They tend to focus on how to improve what exists by looking for hidden possibilities. They come across as energetic, confident and keen to take up the challenge of finding answers. The tutor’s role is to encourage them to get started with the task and to share their insights.

Theorizers are particularly curious and readily question what they are told (e.g. What does it mean?, Why must it be done in this way?). The approach is often systematic and linear, and invariably starts from first principles in order to understand the overall picture. They try to be detached and sceptical of personal opinions. To do this they use individual cases to make a general system of rules. Diagrams are often used to show the link between different elements. The main danger is that these learners risk being lost in the details of the task. The tutor is often led to helping them find their own reasons for wanting to achieve set goals.

Activists are keen to get on with the job without waiting to being told how things work. They prefer to find things out for themselves and tend to be impatient and quickly bored by the slower work of consolidation and implementation. They give spontaneous responses and are enthusiastic about new experiences. Left to themselves, these learners take the initiative and opt for activities with short-term goals. They can end up tackling non-relevant problems in terms of the initial objectives set. The tutor’s role is to ensure that learners do not get too inward looking and loose sight of their objectives.

Table 1. An adaptation of Mumford & Honey’s (1992) *Learning Style Questionnaire*

Given that self-observation reflects learners’ image of themselves and that of the educational process, teachers in (French) adult education need to take into account the needs of *Reflective* learners who tend to focus on, for example, gathering (consuming) information, rather than creating (producing) information (contrary to the *Pragmatist* and *Activist* modes). Second, how can the planning of lessons cater for other types of learning styles, notably that of *Theorizers* and *Pragmatists*. Finally, when compared to the results of the 179 learners polled (Study 1) a significant amount of learners seem not to be aware of their own probable “learning style” when directly questioned about the subject (Study 2). Failing to understand one’s learning style, may explain, in part, some of learners’ difficulties in attaining their learning objectives due to not being able to assimilate the data in an “appropriate” way in terms of their cognitive processes. How can they be made aware of their likely learning style?

3. SIX EDUCATIONAL PARADIGMS

For teaching to be effective as an act of mediation between what learners know and what they want to know, it is useful to have an overview of the achievements of previous generations of pedagogic style that inevitably influence current teaching practice. From the adult learner’s point of view, this approach could explain, in part, their expectations and needs when (unconsciously) referring back to the educational experiences of their youth. For teachers, highlighting this legacy may bring out ideological self-interest, rarely made explicit, forming part of what Thomas Khun (1962) calls a “paradigm” or unquestioned theory or set of beliefs within a given scientific community.

Based on the initial work of Puren (2000), it is possible to expand his initial analysis into a broader nine-faceted table (Table 2 below) to present a mosaic (a series of non-related elements linked more for historical reasons rather than for any intrinsic causes) of various features of the teaching and learning approaches of the last few decades.

Paradigm	1. Reception	2. Impregnation	3. Action	4. Reaction	5. Construction	6. Interaction
Significant learning happens by	direct assimilation of knowledge transmitted by the teacher	intensive exposure to the source of knowledge	completing pedagogic tasks	reacting to pedagogic prompts of the teacher/teaching tool	building up a personal system of knowledge	meaningful exchanges
Guiding model of mediation	teacher-centered	individual's needs & wants	physically active learners	linear & highly structured teaching content	self-awareness ("learning how to learn")	negotiation among learners & with the teacher
Preferred pedagogic mode	lectures	self-discovery, workshop activities	"laboratory" work	programmed teaching, e.g. drill work	self-monitoring activities	discussion groups, collaborative activities
Dominant pedagogic type of tool	teacher-led tools e.g. talk & chalk, commenting on written texts	"real-life" tools used in a personal context	real-life tools adapted to a pedagogic context ¹	machine-driven "teaching machines"	learner-driven pedagogic tools e.g. personal computer ²	network-linked tools e.g. Internet
Dominant sensorial modes	aural ³	visual ⁴ , tactile ⁵	aural, kinaesthetic ⁶	visual, tactile, kinaesthetic	visual, tactile	aural, tactile
Dominant symbolic perceptual modes	verbal ⁷ , sequential ⁸	verbal, non-verbal ⁹ , non-sequential ¹⁰	non-verbal, sequential	non-verbal, sequential	verbal, non-verbal, sequential	verbal, non-verbal, non-sequential
Learners are primarily expected	to be attentive to the teacher	to maximize learning opportunities	to participate in class	to react in a set way	to produce verifiable statements in terms of their needs & wants	to balance out their needs & wants with the socio-cognitive demands of the learning task
Preferred learning style	reflective	activist	pragmatist	(reflective)	theorizer	reflective

Table 2. Mosaic of educational paradigms

To put this analysis of educational paradigms into the classroom context, a one-year study (September 1999 – October 2000) of the sensorial modes of 575 adult EFL learners, at the University (Study 3), reveals that of those who filled in the questionnaire: 67.3% feel they are teacher-dependant; 60.2% see themselves as needing to be physically active (*Kinaesthetic*); and 60.3% say they are able to learn by listening (*Aural*). It seems then that more than two thirds of adult learners expect explicit guidance from the teacher and 60 % of the learners want to be given an opportunity to be physically active and to learn by listening. In other words, even if being physically active and listening to what the expert says are important to learners, they expect even more to have the guiding hand of the teacher present. Given this need for pedagogic guidance, the work of Grangeat (1998:183) allows us

[1] Wiburg, K.M. (1995) An Historical Perspective on Instructional Design: Is it Time to Exchange Skinner's Teaching Machine for Dewey's Toolbox? <http://www-csc195.indiana.edu/csc195/wiburg.html> (consulted 28.10.2000)

[2] see: Edgar, R. (1995) PC is to Piaget as WWW is to Vygotsky at <http://www.iconceptual.com/Siggraph.html> (28.10.2000)

[3] **Definition:** Learners favouring the *aural mode* are specially sensitive to human values, like human warmth and a convivial environment. They tend to focus on communication, teamwork and respect for others in the group (Labour 1998:107). Aural learners represent around 30% of the population cf. <http://www.demon.co.uk/mindtool/mneme1sty.html> (consulted 27.10.2000), this reference is also used concerning *visual* and *kinaesthetic* oriented learners (see below).

[4] **Definition:** In learning by observing, a *visually oriented person* focuses on the details, and the applications of what is being observed. Visual learners make up about 65% of the population (see above). For McLuhan (1964:291) the visually-dominant mode tends to see all things as continuous and connected. This is done by nurturing a fixed point of view, an attitude of detachment & non-involvement, and in separating functions/stages/tasks in time and space (McLuhan 1964:217, 247, 291).

[5] **Definition:** *Tactile oriented learners* need to be in "direct" contact (e.g. the television, see McLuhan 1964: 233,290,292,295) with elements of the object of knowledge. Tactility is "the interplay of the sense, rather than the isolated contact of skin and objects" (McLuhan 1964:273). The related area of haptic technology, has become increasingly important in the development of the new technologies of information and communication (e.g. force feedback applications).

[6] **Definition:** *Kinaesthetic oriented learners* prefer learning according to how they perceive physical performance (e.g. paralinguistic communication involving body language, eye contact, hands and gestures in a given language-culture) in terms of effort, self-image, efficacy, etc. Kinaesthetic learners make up around 5% of the population (see above). This mode is not situated in any one particular part of the body, as those of seeing and hearing, and involves a nonlinear perceptual process.

[7] **Definition:** The *verbal mode* implies a system of communication that consists of statements with a syntax.

[8] **Definition:** *Sequentiality* implies a process that has a pre-set beginning, middle, and end.

[9] **Definition:** The *non-verbal mode* consists of statements with no obvious syntax (e.g. images, gestures, tones of voice, use of space, clothing cues, colours, taste) and assumes a high level of literacy. Studies show that nonverbal cues are 50% effective, while words are only 7% effective cf. <http://www.trnty.edu/depts/education/teach/communication/nonverbal.htm> ; <http://mhhe.com/socscience/speech/commcentral/mgnonverbal.html> (consulted 27.10.2000)

[10] **Definition:** *Non-sequentiality* has no pre-set order, the person chooses how to organise the available segments of data

to look at how two dominant educational approaches, inspired by the works of Jean Piaget and Lev Vygotsky respectively, tackle the issues of how people acquire knowledge in terms of external teaching agents.

Jean Piaget : self-structuration	Lev Vygotsky : (guided) co-selfstructuration
a) biological view of learning where the individual first needs to have a certain level of mental development before being able to have meaningful contact with the social context - structuralist view of learning	social view of learning where it is the concepts from others in society that stimulate the individual's internal mental development - functionalist view of learning
b) discovering things by oneself and dialoguing with "objects" of learning	stress on social interactions and on the ability to get help from others
c) skeptical about the efficacy of (explicit) mediation ("Each time one explains something to a child, one stops him/her from inventing it.")	mediation is decisive ("If the child makes one step in learning, he advances two steps in his development.")
d) role of the specialist is to provide a rich environment and to facilitate cognitive conflicts that are the driving force of mental development	role of the specialist is to identify when the learner is in a <i>Zone of Proximal Development</i> and to help him/her complete a task first by being helped and then by him/herself
e) especially useful for error analysis and to plan how to overcome a learner's difficulties	especially useful for gradually building up (scaffolding) challenging teaching/learning units

Table 3. Brief comparison of some of Piaget's and Vygotsky's contribution to educational theory

4. THE CONCEPT OF SCRIPT CREATION APPLIED TO THE DESIGN OF A LESSON

It is not sufficient, however, just to know what information content is suited for learners. It is equally necessary to know how to present this information in an "appropriate" way. To do this the preparation of information content, for example *via* a lesson plan, involves selecting and organizing data, in other words defining a planned structure consisting of sub-sections, itself able to be broken down to its most basic level. The term "document" designates this organized structure.

Definition: A *document* is an organized structure of lower level elements of information. A document is thus information content that can be applied to a given medium/tool. Hence, a computer screen, a cassette audio, a book, a piece of canvas, etc. is not in itself a document but only the material base/tool of the document.

Definition: "A *hyperdocument* is a content of information made up of a nebulosity of fragments, whose sense is constructed by each of the given reading routes" (Balpe 1990). This definition does not make any reference to a corresponding physical medium. It is linked to the concept of "document" mentioned above, but adds the dimension of the multiplicity of (reading) routes, presupposing the possibility for users to intervene in the distribution of the contents, in particular in the means of selection or in the numerous choices (interactivity).

Definition: A *lesson* is a hyperdocument with pedagogic or cultural aims. A lesson consists of having access to objects of knowledge available *via* the various teaching media as well as their technical variants (hyperdocuments, hypermedia, and more traditional tools like chalkboards, books, etc.). In short, the term "lesson" refers to the structure that controls the organization of the constituent pedagogic sub-elements while being totally independent of the physical object ultimately constructed.

When designing a lesson, it is often useful for the teacher to have a way to make explicit the intended structure of the lesson. This can be done by creating a mental/conceptual model of the lesson. Traditionally, teachers design a lesson plan based on a "document" structured into different interconnecting parts. The lesson plan can then be given to the learner by way of a "summary". With the summary, learners can then look up any section of the document wherever it be on the chosen medium/teaching tool. In this way, a distinction is established between the actual physical putting into practice of the (teaching) content, and the various aids used to look up the different parts of the lesson. Though a sequential style of reading is still the most common, with this technique different types of reading routes now become possible even in the case of a linear approach. For example, widely diffused written culture, i.e. the press, has diversified the ways of having access to knowledge in introducing parallel procedures of looking for data. Newspaper and magazine pages present with the body of the main article, clearly visible footnotes, cross-references, sub-titles, condensed margin texts, illustrations, boxes of information, etc. In this vein, when one wants to really use the possibilities of sound documents and moving pictures one may need to go even further than the written medium.

In the audiovisual world, the "script" is the working model of creation. The concept of script is complex, and yet has not been the object of much in-depth, critical reflection. The numerous specialized guides that do exist on how authors can improve their script writing techniques (e.g. Seger 1998) give the illusion that the notion of

script is self-evident and thus does not need any further discussion. Yet, this is far from being the case today when the script can no longer remain at the level of lock-step linearity, inherited from the centuries-old written culture aided and abetted by a traditional audio-visual approach in education which has remained the dominant model in the minds of many.

In the case of the cinematographic document, the script is a tool that aids the creation process from the initial idea to the continuity of dialogues. The extended script is able to integrate the different functions of interactivity and allows a break with linearity. In this context, the “lesson script” is not a physical model of data to be put on a given medium nor is it a model of interaction with the learner. The script is a way of *accompanying* the creation of the lesson from the initial idea to its finished state. It serves as a concrete translation of a teacher’s mental representation of a given lesson. This type of script can thus evolve dynamically during the creation process. Between defining the lesson content and creating a complete lesson there is, however, a series of intermediary phases. Previous studies (Leleu-Merviel 1996) have introduced concepts that take into account the evolutive dimension of the script in the progression of the dynamics of the lesson creation process. The first phase, linked to the definition of the lesson content, corresponds to the concept of *diagese*.

Definition: The *diagese* includes everything that belongs to the imagined/proposed setting of the document as expressed through the *lesson content*.

Definition: The *script* refers to a structured content that progresses through a series of events. While the script develops the *logic of the different pedagogic events*, the *scenation* organizes these events together as interacting elements. It can be equated as the “route” (or path) that the learner takes within the structure defined by the script. The scenation is associated with the surface structure as opposed to the *deep structure of the script*. In particular, the impact of the interactivity modes is transformed by a scenation that, though predetermined, develops itself during the interactive session. It is in this sense that a teacher can interrupt the linearity of a prepared lesson to “spontaneously” present a part of the lesson, which should have been dealt with at a later time, in order to instantly and directly respond to a question.

Definition: The *scenation* (Colin 1992) implies the *organized structure of events* and/or states with which the learner actually interacts. It is made up of a body of fragments taken from the script to determine how the physical data is linked to the actual production of the script. When the creation of the script and the scenation’s outline has been done, the lesson exists in an “abstract” way. It is, for example, the text of a play, or the musical partition. It is neither the play itself (the theatrical performance), nor the concert (the musical performance). The performance transposes the abstract document into a reality perceivable to the physical senses.

Definition: The *scenic*, or the concrete presentation, refers to the process that allows the transposition of the text into a *concrete reality*. It is the result of aesthetic choices, practical or financial constraints, conditions of usage, etc. The scenic deals with the choice of the medium for a given fragment taken from the scenation’s structure: text, sound, or both together, etc. Similarly for the data of the document, the scenic affects the precise translation of fragments extracted from the script, given that one should carefully consider how the learner’s interaction with the environment of the document will be translated in concrete, hands-on terms.

Definition: *Setting up the situation* defines the modes of the *concrete facilitative links between the user and the data* of the document. In the multimedia world, it is on the level of setting up the situation, and only on this level, that the creation of user functions will be linked to a button, an icon, a joystick, a click, a captor, a data glove, a virtual reality immersion headset, etc. In this way, we see how setting up the situation deals with the way that concrete means of action allows the user to navigate in an environment presented by the scenic in order to facilitate the acquisition of knowledge in a given context.

In short, our approach to facilitate the creation of a lesson implies: constructing the *diagese* linked to the description of the content ; constructing the *script* (architecture) in which the acquisition of knowledge progresses sequence by sequence through a series of organized events ; creating the *scenation*, as a constituted structure of fragments from a script with which a user is potentially placed in a real context of interaction ; choosing the *scenic*, which translates the text into a body of physical data, that the user’s senses can perceive ; defining the degree of setting up the situation to establish concrete modes of relations between the user and the data of the document. The term “scenic approach” of lesson planning thus designates using this approach in presenting of teaching content. Its novelty rests in distinguishing five levels of script writing (described above) which, in practice, are far too often misunderstood at the expense of the efficiency of the outcome for the learner.

5. DEVELOPING PERSONALIZED LEARNING TRACKS

Guided by the various educational paradigms (Table 2) and the insights of Piaget and Vygotsky (Table 3), two broad types of lesson scripts can be proposed. First, there is a lesson script based on *optional tasks* to ensure that learners who have had access to the same core data can, at various moments, supplement or refresh the input of

data according to their personal preferences. This approach is particularly useful when dealing with areas of teaching/learning which are likely to cause difficulties (*learning black spots*). A practical example, of such a lesson script is that of proposing various pedagogic activities to be done in a *pluri-media resource center*. Using books, video tapes, audio-tapes, computer programs and network connections, a custom-made “database” can guide learners to appropriate sections of encyclopaedias, pre-recorded demonstrations, lesson summaries, exercises, etc. The danger with this type of script, however, is that it may ghettoize learners, or reinforce preferences and tastes which may not always facilitate a broadening of the learner’s mind.

The second type of lesson script is that based on a “*tunnel*” of *multimodal activities* to get students to explore different ways of appropriating data. To do this, activities are proposed for learners to enter a pedagogic “tunnel” to try out, for example, different learning styles through a series of activities in order to complete the lesson. This approach implies that learners need to explore different ways of tackling a given subject. In this way learners are likely to do better in some activities, while in others they may need help. Such an approach can prove particularly useful in guided *project work* (e.g. case studies, simulations, co-operative activities), *evaluation activities* (e.g. France’s innovative *Diplôme de Compétence en Langue* based on a standardised script to validate language abilities¹¹) and with *innovative subjects* that demand a significant change in the habits of learners.

A well-laid out lesson scripts can thus: help those with apparent learning difficulties based on their cognitive and perceptual preferences (accessibility); encourage learners to make choices and/or to explore alternative ways of learning to surpass themselves (self-discovery); orchestrate different teaching/learning resources e.g. email, newspaper articles, videos, sound recordings (co-ordination); be adopted based on feedback from learners and acquisition of new resources (updating); demonstrate how financial investments are being used (accountability).

6. CONCLUSION

The underlying idea of our script-based tutoring system is that there is no ready-made recipe for successful learning. Any attempt at increasing the efficiency of a teaching/learning system ultimately depends on matching learner needs and expectations to the cognitive demands of the learning task and to the constraints of the teaching/learning context. But, before tackling the inevitable questions of logistics and costs in setting up such a tutoring system, it is vital to have in place a system of objective measures to evaluate the efficiency of the different types of tutoring schemes in terms of what learners do, what they feel they have learnt, and how feedback facilitates planning and decision-making. This preoccupation in establishing reliable measures linked to a quality assurance approach is the driving force of our ongoing research in this domain.

ABSTRACT

The audiovisual approach in pedagogics, so closely associated with a lock-step view of teaching in the seventies, has undergone a revolution in recent years. By way of examining how teachers can script a body of pedagogic sequences, or lesson, we look at the different phases of the lesson planning process and how a more innovative audiovisual approach can facilitate this process. First, we outline different learning styles as perceived by learners themselves. Second, we propose an overview of the different pedagogic approaches available to teachers. Third, the different phases of creating a lesson script are described based on a scenic approach. Finally, we suggest two broad types of lesson scripts for the development of personalized learning tracks to demonstrate some of the advantages of having a common platform for apparently contradictory teaching methods, namely linking a narrowly sequential to a broader non-sequential style of teaching.

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[¹¹] <http://www.education.gouv.fr/fp/dcl.htm> (consulted 11.10.2000)