FROM BASIC TO CRITICAL AND CREATIVE THINKING: AN EXPLORATORY STUDY BASED ON BLOGS

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Abstract

Nowadays, when we refer to the Web and its importance in the teaching and learning process, we no longer think of read-only contents, but in the supporting infrastructure which allows to create and share contents and a space for collaboration and discussion, ideas associated to the concept Web.2.0. The blog, as a means to deploy the concept 'on-line interaction' is, according to Granieri, "the most accessible and natural tool for sharing and publishing: in addition to text, images movies and also sound will be increasingly disseminated, because of increasing speed of data transmission" (p. 31) [1]. It is therefore natural that the use of the blog is more and more frequent as a resource, pedagogical strategy or in other capacities at all levels of teaching [2].

In this paper, an exploratory study is presented based on some blogs, focusing on: the methodology for collection of text and multimedia materials; treatment and analysis of data with the *NVivo* software; findings and further evolution perspectives.

The conclusions to derive are: a) the users' spontaneous interventions show characteristics of basic thinking; b) evidence of critical thinking can be found in two contexts: as reaction to a direct challenge, proposed as a comment by a visitor or as an answer to the tasks oriented to this type of thinking proposed by the moderator; c) creative thinking is rare and appears almost always as a reply to the moderator's incentive or that of an attentive specialised user; d) the role of the blog moderator is paramount in the development of complex thinking in the context of blog on-line interaction.

Keywords - blog, complex thinking; NVivo

1   INTRODUCTION

The new technologies have an active and co-structuring role in the models of learning and of knowledge [3]

Nowadays, children and the youth live in a perfectly natural way along with the multiple technologies using them to communicate, research, share, create and, of course, to learn. Digital games, virtual worlds, social software Web 2.0, such as blogs, and a myriad of software and educational sites are today the realities with which this generation of *digital natives* [4] interact in a more informal learning context rather than in school. This intense interaction of children and young people with technologies reflects itself in the way they think and learn, making the teachers' task that of helping them to use these resources critically, since their spontaneous tendency is to receive both information and contents passively. This reality accentuates the need of a child, from an early stage, to develop reflexive and critical skills in order to learn how to build knowledge.

The Integrated Model of Thinking, proposed by Jonassen [5] presents a model of *Complex Thinking* which integrates *Basic, Critical* and *Creative Thinking*. This model explicitly or not, underlies some of the educational blogs intended for children and young people in basic education, which I am currently following, namely in the contexts of teaching and supervision of initial and post graduate student teaching.

In this paper I present an exploratory study based on a number of these blogs. It is an investigative work focussed on a new educational blog analysis angle. Subsequently, and due to the easy access

to blogs, its public nature and the importance of this matter, I will continue the study expanding the sample to a broader cluster of blogs and deepening the analysis pertaining to both the quantity of categories and to the inter-relations among them

2   STUDY OBJECT

Exploratory analysis of blogs in the light of *The Integrated Model of Thinking*, presented by Jonassen [5]. The goal is getting acquainted with the phenomenon, assessing its relevance and finding a focus for further research [6].

3   THEORETICAL GUIDELINES

3.1   ICT in Education: the case of the blog

Accordng to Assmann, "the information and communication technologies have become a constituent element of our ways of seeing and organizing the world (p.19) [3]. Frequently, technologies are perceived as a simple means of accessing information, rendering the subject inactive in its reception. Now, if we need information to acquire knowledge and the latter to achieve wisdom [7], technologies must be employed "as the instrument to learning and the collaborative construction of knowledge" (n.p.) [8]. The technologies "facilitate the entrance to an enormous and diverse set of resources, but do not directly encourage learning" (p.37) [9], that demands an effort of personal creation.

I share the opinion of Carioca *et al*, when pertaining to the use of information and communication technologies at school, they claim that the students "need to develop an approach and a critical conscience concerning the information and communication technologies seeing as the technology can be used and overused in several aspects" (p.12) [10]. In this context, the role of the teachers and childcare workers is foregrounded so as to help students use these resources critically, since their spontaneous tendency is to receive both information and contents passively.

The blog, as a means of deploying the concept of 'on-line interaction' is, according to Granieri, "the most accessible and natural of the tools meant to the sharing and publication - aside from text, images, films and sounds, that progressively, with the increase in the speed of data transmission, will be spread growingly" (p. 31) [1]. The complimentarily amongst the diverse communication formats, based on the web 2.0 applications, allows a greater effectiveness in the creation and diffusion of the message,It is therefore natural that the use of the blog is a more frequent resource, as a pedagogical strategy or in other competences in all levels of teaching [2]. Pombo, considering the viewpoints of several authors, finds that the use of the blog allows "the development of innovative and transforming activities... [and develops] in the students the ability of making decisions, defining personal and group objectives, the sense of belonging and of responsibility, originality, creativity, communication and socialization, construction of knowledge and of their own identity (p.3) [11].

Efimova and Fiedler call attention to the fact that one of the most interesting characteristics of learning in a blog is the "support for the development of meta-learning skills. The externalization of inner conversations and reflective thinking makes this content available for review and development, thus encouraging and amplifying the acquisition of better skills for self-observation and intentional change" (p. 493) [12].

Consequently, the public exposure inherent to the fact that we are dealing with an online resource, increases the responsibility and the effort to improve students' productions, in terms of expansion, deepening, reformulation and even creation of new topics. The comments and the answers to many proposed challenges allow the development of different forms of cognitive skills.

Since the ultimate goal of education is preparing students to be lifelong learners, and competent citizens, able to control technology and survive in a technological world, it is up to the school to create learning environments that encourage the development of high level thinking skills, amid which the reflexive, critical and creative thinking.

3.2   From basic to critical and creative thinking: the *integrated model of thinking*

The *Integrated Model of Thinking* [5] defines complex thinking as an "interactive system, not a collection of separate skills" (p. 27). It is, accordingly, a continuous process of articulation and inter-

dependence of three basic components: content/basic thinking, critical thinking and creative thinking skills.

Content/basic thinking refers to the fundamental knowledge, "skills, attitudes and dispositions required to learn accepted information – basic academic content, general knowledge, *common sense*, – and to recall this information after it has been learned" (pp. 28-29) [5]. It includes, therefore, the process of learning and of retrieving what has been learned. Critical thinking, associated to the capacity of reorganizing ideas and knowledge "involves the dynamic reorganization of knowledge in meaningful and usable ways…it involves three general skills: evaluating, analysing and connecting" (p. 29) [5]. Creative thinking, linked to the ability of generating new knowledge, "requires going beyond accepted knowledge to generate new knowledge. The major components of creative thinking are the ability to synthesize, imagine and elaborate (p. 30) [5].

During the fulfilment of activities, the students engage in a continuous process of complex thought in which they combine the three types of thought mentioned before. In the case of blogs, the presented activities do not always reveal those three types of thought, which doesn't mean that they did not occur during the work performed in class.

4   METHODOLOGY

4.1   Data collection

In line with Strauss and Corbin [13], the researcher has to choose a group where he can find evidence of the phenomena he intends to study. Thus, and as this is an exploratory study, I have selected seven educational blogs, integrated in the curricular work of the class, which were intended for children and young people in pre-school and elementary education, who I am currently following in the contexts of teaching and supervision of initial and post-graduate student teaching.

It was, therefore, a *theoretical sampling* which seeks not the representation of the sample, but the representation of concepts [13]. I chose blogs in operation for more than a school year and relative to different teaching levels. The first blog to be indicated is for pre-school/kindergarten (3-5 years), the last is for junior high school (12-15 years) and all the others to elementary school (6-9 years). After the URL of each blog, the name of the teacher/ administrator.

http://dajaneladomeujardim.blog.com/ Ádila Faria

http://www.osferreiritas.blogspot.com/ Escola de Ferreiros

http://eirinha-turmae.blogspot.com/ José Dias

http://magnificos06.wordpress.com/ Helena Vilas-Boas

http://novaeralusitana.blogs.sapo.pt/ Helena Daniela Freitas

http://oaprendizfujacal.blogspot.com Escola do Fujacal

http://paulofaria.wordpress.com/ Paulo Faria

All blogs present other communication formats aside from writing: text and image; text and sound; text, sound and image; slideshow and video. They are, hence, multimedia data that can be cropped in *NVivo*, some as *documents*, others as *externals*.

4.2   Data analysis

Following these blogs allowed me to obtain a holistic vision of the data and to be aware of the large number of categories and the possible connections between them. It was due to this vicinity and familiarity with the data, that I started to relate them to the *Integrated Model of Thinking* by Jonassen [5]. The author identifies a set of descriptors that allow accomplishing the function of the *Basic, Critical* and *Creative Thinking*.

Initially, the previous structuring of the categories of analysis based upon those descriptors appeared to be a benefit for the analysis and therefore I created such a structure. However, in the early steps of the process, I deemed this structure an impediment, almost mechanizing the analysis procedures, when what interested me the most was exploring the issues, understanding the phenomena.

As a result, I decided to alter the strategy of the analysis. I acknowledge that Jonassen's model was

ultimately a strong influence, mainly in the final stage of the analysis process, as noticeable in the findings of this study.

I opted for the typical *grounded theory* techniques that I normally use in the analysis of qualitative data. Glaser e Strauss [14], creators of the *grounded theory* and later Strauss and Corbin [13] considered that "the analysis is composed by three types of codes– *open coding*, *axial coding* and *selective coding* ... the separation between each type of coding is artificial... [it] doesn't necessarily happen in stages. In one session of coding the researcher may need to move from one to the other". (pp. 57-58). In fact, this happened in my analysis.

According to these authors, the first and most important moment when performing an analysis is the developing of an *open coding* as extensive and wide as possible. It involves segmenting, examining, comparing and conceptualising data through a *constant comparative method* [13]. Concepts are the basic units the researcher works with [13, p.63]. Conceptualisation of data means no more raw and descriptive data: concepts are identified and attributed a *conceptual label*, the *code*. That code will be used to label similar incidents so that it is also a first step into data reduction. The intention of giving precision and specificity to the concepts creates an increasing number of codes at an initial phase. Concepts are then grouped into conceptual *categories*, a process called *categorizing*, which is one more step in data reduction. It's a process of de- contextualization of data: fragments of text are taken from their natural context and transferred to a conceptual context, the categories. The original data was not changed and with NVIVO it is possible to have an easy and fast access to the original context of a segment coded under any category.

In this stage, many emerging categories were identified. The *axial coding* consists of a set of proceedings that aim at restructuring the data coded through the *open coding.* The categories are "analysed by their specific characteristics and then reorganised according to the connections between them" [13, p. 97]. This examining of the specific characteristics of a category, now under the perspective of an axe, as well as the construction of a network of conceptual connections with other categories, has led me to the identification of some of the main categories, and to the subcategories around them. Strauss and Corbin stress that "even though open and axial coding are distinct analyses procedures, during the analyses the investigator alternates between them" [13, p. 98].
Axial coding function is used to develop the categories and the articulation among them. While open coding is above all intuitive and emerging, axial coding is intentional and more complex. The technique of *constant comparison* is still used, but in a more focused way, examining one category at a time and trying to find out how that and other categories and subcategories relate to one another. At this stage of the analysis, I frequently used Jonssen's descriptors for the *Basic, Critical* and *Creative Thinking* departing from them, and also from Bloom's revised taxonomy of *the cognitive domain* [15], in order to name concepts/categories of analysis for the various activities presented in each blog.

The most abstract, integrated and complex stage of the analysis is the last one: *Selective coding* [13]. For Strauss *selective coding* happens when the analysis circumscribes coding only to central categories. In this final stage a "story line" is constructed [13], supported by a central category, which must be easy to find as it reflects what is more important to the participants, and by the connections between it and the other more relevant categories of the study.

The implementation of these conceptual procedures was through NVivo, a "software designed to assist management and analysis of qualitative data. … It can be used to explore trends; build and test theories; and manage, code, interpret, and analyze qualitative data by eliminating the need for many of the manual tasks traditionally associated with qualitative analysis" (p. 106) [16]. In NVivo, firstly I categorised the entire corpus through the open coding process; afterwards, via the queries and using special boolean and contextual operators, I proceeded to the axial and selective coding. The findings presented next are the outcome of this analysis process.

5   FINDINGS

Jonassen's *Integrated Model of Thinking* explains the mental processes which occur in a continuum and articulated way in the construction of knowledge. In this context, to think in a complex form consists in relating and activating in an interdependent way, basic, critic and creative skills. It is therefore an interactive system, not a collection of separate skills.

They are here presented separately for the sake of analysis, but I assume that underlying critical and creative thinking are always basic skills, the first moment in the process of development of a higher order level of skills.

Even if this study is centred in cognitive competence, I shall refer briefly the socio-affective competences and the role of the teacher/ administrator of the blog.

Considering a) the required size of the paper format; b) the fact that often short extracts do not illustrate adequately the respective category, requiring access to its context, and c) much of the information in the blogs is in multimedia format, I shall present the links connecting to the examples. Another advantage of the digital!

5.1 Basic thinking

Basic thinking is thought process which the student uses to acquire or retrieve from memory previously acquired knowledge. This elementary content thought process represents the competences, attitudes, and conditions required for the reception of basic information of contents using this information after it was comprehended.

Identifying and describing

http://osferreiritas.blogspot.com/2009/01/maior-flor-do-mundo-de-jos-saramago.html
http://magnificos06.wordpress.com/2008/05/
http://oaprendizfujacal.blogspot.com/2008_06_01_archive.html
http://dajaneladomeujardim.blog.com/1690539/#cmts

Sometimes it is the teacher herself who asks explicitly for this type of task:

Remembering, recognising, recalling and reproducing information,

http://novaeralusitana.blogs.sapo.pt/tag/distritos
http://osferreiritas.blogspot.com/2008/11/o-infante-d-henrique_10.html
http://eirinha-turmae.blogspot.com/ (O Passeio escolar)

Understanding, exemplifying and summarising

http://oaprendizfujacal.blogspot.com/2008/06/os-direitos-das-crianas.html
http://magnificos06.wordpress.com/2008/02/
http://oaprendizfujacal.blogspot.com/2008/06/entrevistas-para-conhecer-melhor-o.html

Aplying

http://osferreiritas.blogspot.com/2008/03/o-nosso-p-de-feijo.html
http://magnificos06.wordpress.com/2006/09/27/
http://dajaneladomeujardim.blog.com/1785066/
http://oaprendizfujacal.blogspot.com/2008_05_01_archive.html

As we can see in these examples, almost all the posts blogs of a class refer to the acquisition and application of information, often fragmented, relating to contents from various curricular areas. This work has an educational value because writing about the contents is one more opportunity for students to practice writing, which, in turn, favours comprehension and cognitive development, since writing reaches a more general level, that of our mental processes [17].

Even if writing is predominant, except in the Kindergarden blog, the information and /or representation of ideas is often presented in multimedia format (image, sound, slideshow, video) developing digital literacy which is more necessary each day. This articulation of different means and strategies to apprehend contents which the blog provides very easily is an interesting form not only of helping pupils to understand better the contents studied but also of developing higher order thinking skills.

In fact the complementary quality of text, sound and image in the creation of a non linear work requires a variety of skills: analysis, definition of criteria for the use of each of the means and their interconnection. Therefore, what may appear as traditional learning may be, after all, in constant interaction with critical and creative thinking, depending only on the pedagogical intentionality of the teacher.

5.2   Critical thinking

Critical thinking is a higher order rational and reflexive thinking. It is manifest when the pupil becomes involved in the dynamic reorganisation of knowledge, giving it meaning. This reorganisation in carried out based on the analysis, evaluation and in the connection between acquired knowledge and others the pupil already possessed.

Many creative thinking skills are closely tied to critical thinking skills, so under this topic we can also find elaborating e synthesizing for instance, which Jonassen [5] includes in creative skills.

Analyse

http://magnificos06.wordpress.com/2007/05/24/leitura-e-livros/
http://osferreiritas.blogspot.com/2008/02/todos-crescemos.html

Monitoring

http://paulofaria.wordpress.com/category/teste/ (preparação para o teste)

(all the interventions of the teacher / administrator of the blog http://paulofaria.wordpress.com in individual blogs of students)

Expanding and elaborating

http://paulofaria.wordpress.com/category/teste/ (preparação para o teste)
http://ritaduarte.blog.pt/4514625/#cmts
http://paulofaria.wordpress.com/2009/01/07/batalha-de-aljubarrota/#comments

Connecting

http://osferreiritas.blogspot.com/2009_01_01_archive.html

Semantic map, less cognitively demanding that the cognitive map, help students to remember and activate prior knowledge by establishing relationships between them and between words

http://dajaneladomeujardim.blog.com/1694799/#cmts
http://www.vuvox.com/presentations/0c62aedb9
http://paulofaria.wordpress.com/2008/12/07/o-velho-e-o-mar-ernest-hemingway/#comments

Synthesizing

http://magnificos06.wordpress.com/2008/05/21/laboratorios-ciencia-e-tecnologia/
http://osferreiritas.blogspot.com/2008/11/palestra-com-o-sr-lopes-bancrio.html
http://paulofaria.wordpress.com/2008/11/02/entrevista-a-valter-hugo-mae/

Evaluating

http://paulofaria.wordpress.com/2007/06/14/avaliacao-final/
http://paulofaria.wordpress.com/2007/06/15/o-blogue-que-nos-faz-pensar/
http://paulofaria.wordpress.com/2007/11/26/esta-ai-o-natal/
http://paulofaria.wordpress.com/2008/12/16/votacao-no-melhor-blogue/#comments
http://paulofaria.wordpress.com/2008/03/06/o-reconhecimento-do-vosso-trabalho/#comments

5.3   Creative thinking

Creative thinking occurs when tasks stimulate the imagination, generating new knowledge. As we mentioned before, creative skills are complementary aspects of critical thinking so they are interrelated.

Thinking analogically

http://novaeralusitana.blogs.sapo.pt/8861.html
http://novaeralusitana.blogs.sapo.pt/tag/imagina%C3%A7%C3%A3o
http://magnificos06.wordpress.com/page/17/ Eu sou …

Producing original ideas or new products

http://dajaneladomeujardim.blog.com/1757660/#cmts
http://dajaneladomeujardim.blog.com/1785066/#cmts

http://magnificos06.wordpress.com/2007/02/ O Monstro
http://novaeralusitana.blogs.sapo.pt/2007/11/
http://dajaneladomeujardim.blog.com/Histórias/
http://dajaneladomeujardim.blog.com/Escrita%20Criativa/
http://paulofaria.wordpress.com/2007/03/21/proposta/
http://eirinha-turmae.blogspot.com/2008/05/nossa-amiga-professora.html
http://magnificos06.wordpress.com/2008/02/14/cartas-de-amor-ilustradas/
http://luisacmfreixo.blog.pt/4075156/#cmts

5.4 From Basic to Critical and Creative thinking: the role of comments

Elementary knowledge contents are in constant interaction with critical thinking as they constitute the basis from which they operate. In blogs, both the comments, intentional or not, and the explicit action of the teacher / blog administrator promote these processes.

In these examples, comments could lead pupils in the first case to expand, elaborate and relate knowledge, reflect and argue and propose original and reasoned alternatives. We agree that the teacher does not always have the opportunity to answer these challenges or even has the time to load all the information on the blog, which does not mean that the issue was not explored in the classroom context, as I am aware it often is the case.

http://oaprendizfujacal.blogspot.com/2008_04_01_archive.html
https://www.blogger.com/comment.g?blogID=6179797685888543441&postID=4623706217699800548
http://eirinha-turmae.blogspot.com/2008/05/arca-das-trapalhadas.html
http://historiasdojoao.blog.com/4081250/#cmts

There are some cases, as I shall explain next, where the reactions to the stimuli are presented in comments, making in this way visible how from basic thinking pupils evolved to critical and creative thinking.

http://dajaneladomeujardim.blog.com/1597311/#cmts
http://dajaneladomeujardim.blog.com/1531847/#cmts
http://joaofernandes.blog.pt/4308058/#cmts
http://paulofaria.wordpress.com/2009/01/07/batalha-de-aljubarrota/#comments
http://paulofaria.wordpress.com/2009/01/07/batalha-de-aljubarrota/#comments

5.5 The role of the teacher /administrator

Discussion of the teacher's role in fostering critical and creative thinking must begin from a recognition of the teacher as a person whose unique character, interests and desires can not be separated out from the idea of the teacher's role. Good teachers are doing more when they teach than acting according to prescribed roles. Their desire to nurture a love for learning, to help students recognize and act upon their capabilities, and to establish a classroom climate which is based upon mutual regard and respect gives their teaching purpose and meaning beyond any technical description of the teacher's role. What is required is that teachers be authentic individuals who are striving to improve their practice through the use of critical and creative thought. Acting upon their belief in the importance of critical and creative reflection, teachers would attempt to.

In this point I shall select two blogs where the proposals and challenges of teachers /administrators lead towards the development of high order level skills. In the first blog this intention is visible in the explanation of the educational interest of the activities the children develop as part of the Curricular Guidelines for Kindergarten, both in the posts as in the replies to the comments.

http://dajaneladomeujardim.blog.com/Escrita%20Criativa/
http://dajaneladomeujardim.blog.com/Experiências/
http://dajaneladomeujardim.blog.com/1638410/#cmts
http://jicheleiros1.no.sapo.pt/videoconf.html
http://dajaneladomeujardim.blog.com/Pais/
http://paulofaria.wordpress.com/

The second blog is intentionally oriented towards the development of critical thinking as the author explicitly refers when talking about on of the activities. (http://recursoseb1.com/milp/?p=135)

This is a blog by a Portuguese Language teacher where there are links to the 63 individual pupils's blogs. The teacher, in articulation with the work performed in the classroom, loads on his blog the

proposed activities. Pupils's replies are mainly presented in their own blogs. The teacher comments these works by the pupils, evaluates them, proposes and follows the alterations requested. The pupils comment and help each other. The intellectual, social and affective involvement of all those intervening in these interactions is quite visible, both in pupils and teacher.

5.6 Socio-emotional skills

The interaction and sharing attitude that is established between pupils, teacher, family and the community suggests that the socio-emotional dimension is important for the learning process. We realized, mainly in the blog http://paulofaria.wordpress.com/, that pupils, when sharing doubts and knowledge, assume the responsibility of their learning and that of their peers as they answer to their doubts, suggest other study resources, look for information that they will share later. We can witness therefore, a great investment in collective work.

http://paulofaria.wordpress.com/2009/01/30/preparacao-para-o-teste/
http://paulofaria.wordpress.com/2008/11/29/teste-de-lingua-portuguesa-ii/

Public exhibition of work that may include errors indicates that pupils feel confident that having done their best, they will share it and be prepared to receive criticism and suggestions. Often they ask for help in specific aspects. They agree to correct their work several times, after suggestions from the teacher, from peers and other commentators, revealing persistence and a determination to improve. This collaborative and comfortable environment and the constant support by the teacher / administrator, interfere in a positive way in the learning process. However important the technologies may be, it is my conviction that "at the core of pedagogical quality lie the human interactions, among which it grows and develops. In the context of ICT as in any other, it will be found in the teacher-pupils interaction … supporting, stimulating and challenging them to learn using ICT" (p. 12) [10].

6 CONCLUSIONS AND FURTHER EVOLUTION PERSPECTIVES

These findings allow us to conclude that: a) the users' spontaneous interventions show characteristics of basic thinking; b) evidence of critical thinking can be found in two contexts: as reaction to a direct challenge, proposed as a comment by a visitor; or as an answer to the tasks oriented to this type of thinking proposed by the teacher; c) creative thinking is rare and appears almost always as a reply to the moderator's incentive or that of an attentive specialised user; d) the role of the blog administrator/ teacher is paramount in the development of critical and creative thinking in the context of blog online interaction.

Therefore as this is an exploratory study, I will present the following guidelines for further research:

1. Analyse other educational blogs in the light of Jonassen's model [5];

2. Study strategies in order to, using the comment model, propose activities oriented towards the development of critical thinking;

3. Analyse the two blogs (http://dajaneladomeujardim.blog.com and its sequel in janelajardim.ning.com and http://paulofaria.wordpress.com/) where the presence of both critical and creative thinking is evident in the light of the conceptual model for online learning [18] whose core elements are: cognitive presence, social presence and teaching presence.

7 ACKNOWLEDGEMENTS

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