USING WEB-BASED RESEARCH TASKS FOR THE PROMOTION OF DEEP LEARNING

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Introduction

This article draws on the concept of using the enormous cognitive and linguistic potential of Web resources for better and deeper learning. It concentrates primarily on how these resources can be used to train EFL college learners in approaching complex research tasks in a thoughtful manner, and, consequently, using deep learning strategies. It is based on the assumption that students' ability to use Web resources creatively cannot be taken for granted since their educational experience has taught them to be surface learners. Thus, the strategies they spontaneously turn to are those of memorization, repetition and, generally, a passive reproduction of the input. Drawing from her teaching experience, the author of this article suggests a procedure for a Web-infused training, in which a special emphasis is placed on the process of framing research tasks and employing deep learning strategies in the process of their completion.

Deep learning vs. surface learning

Partly in response to the ever increasing accessibility of information provided by new technologies, much attention is currently being devoted to making learners active and autonomous participants of the learning process. With information of any kind being nowadays abundant and easily available, it seems that any learning situation should aim at coaching learners to treat it as a starting point for the creation of a new product. This is possible if they are not afraid to engage in a wide range of higher-order thinking processes nor discouraged by the intellectual effort that this kind of manipulation undoubtedly requires. Here, the deep-surface dichotomy, although relatively new in a pedagogical context, appears to best illustrate how students respond to resources.

First of all, it is common to point to the volitional aspect of the dichotomy using the two terms, namely *deep* and *surface,* to refer to learners' general approaches to learning. In brief, learners with deep approaches learn to understand whereas those with surface approaches learn for fear of failure (Biggs, 1987). This dimension appears to be closely

connected with learners' motivation and has become the subject of several research studies (Marton, Saljo 1976; Biggs, 1987). The other aspect of the deep-surface dichotomy that has also been given enhanced attention is connected with the amount of cognitive manipulation that learners engage in. It can be linked by learners' general approaches to learning, yet it can also prompted by a pedagogic task. Here, *deep learning* has come to encompass the kind of input processing that results in the creative production of a new quality. The deeper the processing of the input and the deeper the strategies that learners employ, the more valuable the learning outcome[i]. In contrast, *surface learning* is typically characterized by the uncritical acceptance of input and followed by its memorization and a possibly faithful recall. The most common strategies used in surface learning i.e. memorization, repetition and rote reproduction, do not require any intellectual manipulation of the material under study and, thus, result in learners' mental passiveness.

Desired as deep learning is for students' intellectual growth, it is rarely spontaneous and seems very unpopular, especially among academically struggling students. First of all, it requires much greater intellectual effort than surface learning. In practical terms, this means that even well motivated students may choose not to engage in deep learning due to time constraints or in order to reduce an over-heavy learning load. It can also be hypothesized that most learners, especially in the Polish reality, are not aware of the difference between surface and deep learning strategies and they do not know how to transform the information they are exposed to. With the traditional transmission pedagogy conventionally prioritizing reproduction rather than creativity and expecting learners to absorb and reproduce as much factual information as possible, it is no surprise that the vast majority of them have been coached to be surface learners and that this type of learning is the only learning they are familiar with.

The value of deep learning in the EFL classroom

The issue of deep learning seems especially worth investigating in the context of foreign language instruction. Here, paradoxically, surface learning strategies make a valuable and efficient part of learning experience. Learners of any foreign language, especially at the early stages, are commonly expected to use surface strategies of memorization, repetition and rehearsal e.g. during drills or while memorizing new vocabulary items. Indeed, these strategies prove extremely efficient in learning small chunks of material. Interestingly enough, some methods of foreign language instruction e.g. the Callan's Method tend to rely almost entirely on these strategies. It comes as no surprise, then, that even advanced and mature

language learners, being convinced of the efficacy of the strategies in question, tend to rely heavily on them even in academic contexts, where tasks commonly require deeper intellectual transformation of the input. It can even be argued that it is the inadequate transfer of surface strategies to cognitively complex tasks of research work or term paper writing that is responsible for low quality papers devoid of learners' personal contribution, with information uncritically copied from other, usually electronic sources.

How to encourage deep learning?

The question is how to make learners employ deep learning strategies against the ingrained habit of surface learning. Literature in cognition confirms that students' intellectual effort can be stimulated by means of properly designed tasks. It is worth noting that task cognitive demands, i.e. the quality of intellectual processing required for its successful completion can be regulated on the level of each of the three task components, namely the input, the output and the elaboration stage (Ellis, 2003, Robinson, 2001).

In the context of CALL, these are Web-based tasks that seem extremely promising for the promotion of deep learning. In such tasks the Web serves the role of the input and this single condition makes them particularly conducive to fostering higher-order intellectual processes. It can be easily noticed that Web resources fulfill several of the general criteria that have been identified as encouraging intellectual stimulation. First of all the Web, unlike traditional print sources, provides information of varied quality, existing in disarray, with plentiful of extraneous information to be sifted out by the user. In addition, the sources are linked by means of multiple relationships – here existing almost physically in the form of hyperlinks and hypertext. Indeed, research confirms that all the above features require the learner to employ complex thinking processes, since he by himself needs to establish basic organizing principles, recognize the relationships existing between particular elements of the input, decide upon his criteria of evaluation and then apply them to particular sources (Halpern, 1996; Candlin, 1987).

Another feature that dramatically increases cognitive demands of input is the novelty factor, whose importance in stimulating cognitive functions is widely discussed in literature (Nunan, 1989; Candlin, 1987; Halpern, 1996; Sternberg, 1981). In general, any new situation activates one's attention and breaks already established mental habits. As Jonassen (2004) explains, it prevents one from relying on the previously developed thinking routines and, therefore, calls for deliberate effortful attention. As regards Web resources, the novelty factor can be attributed to the fact that every single website is unique in terms of its navigation and

design principles, which requires the user to discover the rules of navigation by themselves. In fact, this applies to other electronic environments such as search engines, online libraries, e-learning platforms or even online shopping. For instance, each of the several search engines available on the Web follows its own rules of navigation, uses its own search strategies and displays the results in a different fashion.[ii]

The role of the novelty factor can also be discussed in the light of linguistic authenticity, which is so abundantly provided by Web resources. By and large, cognitive value of authentic texts lies in the fact that the reader, trying to bridge numerous gaps in comprehension, constantly activates his prior knowledge. In the process, he makes predictions, hypothesizes and uses contextual and non-linguistic clues to compensate for lexical deficiencies. Moreover, in Web resources linguistic authenticity is additionally accompanied by cognitive authenticity, since the online environment lends itself well to inducing the cognitive processes that genuine practitioners would typically engage in. In other words, while using the Web as a collection of data in the foreign language, learners easily engage in the same activities as native Web users would follow e.g. they choose the most appropriate search strategies, hypothesize on the content of the located documents and evaluate them, or scan webpages for particular information. Obviously, cognitive authenticity is lost if teachers make students use EFL-dedicated websites.

- **lack of clear organization,**
- **varied quality of materials** (**information noise)**
- **multiple relationships existing between particular elements** (Candlin, 1987),
- **novelty factor** (Nunan, 1989, Candlin, 1987),
- **linguistic authenticity,**
- **cognitive authenticity** – inducing the cognitive processes that practitioners are engaged in (Sugrue, 2000).

Table 1. A selection of features that contribute to input cognitive demands.

In the light of the above it seems justified to assume that the single fact of using the Web as task input should easily lead to deeper learning than that generated by traditional print sources. Yet, even the most cognitively stimulating input can be stripped of its cognitive potential if it is followed by a traditional data-reproducing activity. For example, making learners cite factual information from an authentic text will undoubtedly leave its cognitive

potential unexplored. In contrast, the task of collecting information on two different products with the purpose of comparing or evaluating them requires deep cognitive manipulation of data. However, even then learners may choose to adopt a surface approach to the task and reproduce data rather than transform it.

Training learners to approach research tasks

The question is how to make students exploit the cognitive potential of Web-based materials to its fullest. It seems safe to hypothesize that genuine practitioners use Web resources mostly for research-like tasks which require purposeful information gathering followed by its manipulation and creative production. This raises the possibility of implementing Web-enhanced instruction in academic contexts where most tasks are research-like[iii]. Such tasks share certain characteristic qualities that contribute to their increased cognitive demands, which are enumerated in Table 2 below.

- require investigating an issue and solving a problem (Johns 1997);
- based on external sources either written or oral;
- interdisciplinary;
- the problem can be viewed from several perspectives, each of them affecting the final product;
- require independent individual work or team effort (whichever the case, teacher's assistance is limited);
- the learner needs to build on already practiced sub skills – note taking, summarizing, paraphrasing, quoting, writing but also comparing, evaluating (Spack, 1998);
- the situation is ill-or non-structured, with multiple solutions available.

Table 2. Characteristics of research tasks.

As can be seen from the above presentation, research tasks unquestionably belong to the most challenging academic assignments. In fact, each of the above listed features requires the learner to engage in complex thinking processes. Although it is beyond the scope of this article to discuss all the features in greater detail, the ill- or non-structured character of research tasks deserves a particular mention. Lack of clear structure means that such a task is perceived by the learner as a problem because it is disorganized, with multiple solutions, interpretations and goals available (Halpern, 1996)[iv]. Thus, while approaching a research task

learners in fact undergo the problem-solving procedure: they need to acknowledge the level of their familiarity or unfamiliarity with the subject, identify gaps in their knowledge and then use the pre-defined knowledge to recognize the nature and condition of the problem to be solved (Derry, 1988). Then, they need to recognize the cognitive goal of a task, e.g. whether it requires factual or procedural knowledge or whether the information needs to be detailed or general. In the process students not only need to make use of additional cues that arise from the context but also recognize and dismiss any irrelevant information that reduces their understanding of the situation. Thus, their reasoning skills are activated in the process of compensating for the lack of internal structure (Brown et al, 1989). In fact, all such activities call for intellectual effort and constant intellectual manipulation of all the data available.

Even casual classroom observation reveals that having been coached to deal with clear-cut classroom activities, the average EFL student seems unable to cope with confusion, lack of knowledge and information noise that research tasks undoubtedly involve. Thus, it can be claimed that it is students' lack of experience in dealing with research procedures that frequently prevents learners from successful task completion and makes them slip into the well known habit of surface learning (Kurek, 2003). Bearing the above in mind, there seems to be a need to provide learners with a training that would help them both cope with task cognitive demands and progress from surface to deep learning. The procedure presented below provides an outline of this kind of training broken into three easy to follow steps, each of them instructing the learner how task perplexity can be successfully curbed by means of purposeful task framing. It needs to be emphasized that the training is Web-enhanced, with Web resources providing cognitively stimulating input.

Training description

The description provided below presents the three central stages of a much larger procedure aiming at developing EFL college students' research skills, with a focus on a creative use of Web resources and cooperation skills. Due to the limited scope of this article the initial procedure for topic negotiation and group forming has been omitted. It needs to be stressed that the topics that students elaborate on are very broad and interdisciplinary. This is done with the purpose of highlighting the process of task framing. Only later are students presented with more detailed instructions that give specifications as to what kind of a learning product is expected of them.

A brief description of all the three steps is presented in the table below.

Step 1: Identifying knowledge gaps.
Step 2: Identifying different perspectives.
Step 3: Developing expertise.

Table 3. Suggested procedure for training students in framing research tasks.

Step 1: Identifying knowledge gaps.

Instructions for learners:

1. *Make a list of basic questions that need to be answered in order to get started.*
2. *Use the Web to answer them.*
3. *Meet your partners and check/share what you have learnt.*

The purpose of this stage is to make learners accept the fact that it is doubt, uncertainty and generally lack of knowledge that drive genuine research work. It seems that the majority of learners wrongly perceive lack of knowledge and the ensuing feeling of confusion as an inhibition discouraging them from further effort rather than intellectual stimulation. Thus, the first step imitates the initial stage of dealing with a problem-solving situation. In order to separate what is known from what is to be learnt, students compile a list of foundation questions, the answers to which will provide them with basic factual information. For example, students researching the subject of earthquakes are expected to generate the following questions:

- What are earthquakes?
- Where do they occur?
- Why are they dangerous?
- How do they happen?

The answers are to be found on the Web and then shared orally with other team members. Students work within set time limits (circa 15') and are instructed to take notes, although they are not allowed to copy the information verbatim.

Although this stage is seemingly simple, it reveals one of the major weaknesses of students' interaction with Web resources. While proceeding through numerous electronic texts in the attempt to unearth the answers, learners do not make the effort to internalize the information they find. Instead, they glide over texts focusing on the linguistic level only, without any deeper assimilation of the content. This becomes clear when they meet other group members to share search results. Even casual observation reveals that most of the

students are unable to pass very basic information in their own words, without the support of the original text displayed on the computer screen - a pattern of continuous recurrence among surface learners. This leads to the further conclusion that having easy and unrestricted access to plentiful sources gives students the soothing appearance of possessing knowledge whereas what they have is raw information[v]. In the context of the training in question, this experience has a more universal dimension since it is warning that information needs to be internalized and that this process is rarely effortless – an important lesson to be learnt as regards students' future encounters with electronic texts.

Step II: Identifying different perspectives.

Instructions for learners:

1. *What are the different perspectives you can view the topic from?*
2. *Choose the perspective that appeals to you most.*

The aim of the middle stage of the training in question is to make students sensitive to the interdisciplinary aspect or research tasks and, consequently, to the counterarguments that might be provided by readers representing other areas of expertise. In fact, only traditional classroom activities are artificially kept within the bounds of one discipline, whereas tasks performed by genuine practitioners border on several ones. For instance, writing an essay on literature requires the knowledge of the history of a given period, social background and, obviously, the knowledge of literature heuristics. Similarly, the already mentioned research work on earthquakes will call for the background knowledge of geology, geography, seismology or even rescue techniques. The process of identifying these perspectives is likely to deepen students' understanding of the task and help them see the complexity of knowledge.

Step 3: Developing expertise

Instructions for students:

1. *Make a list of more detailed questions for the perspective you have chosen.*
2. *Use the Web to answer the questions and explore your area of expertise in greater detail. Take notes but avoid copying somebody else's words.*
3. *Meet your team mates and share what you've learned.*

The last stage of task framing allows students to develop a sense of expertise and, at the same time, is intended to draw their attention to the role of cooperation. This stage reflects the multifaceted nature of contemporary real-life tasks undertaken by genuine practitioners.

Since such tasks are interdisciplinary, they require team effort and, consequently, close cooperation between highly qualified team members. Similarly, each of the students in the process of developing their own expertise stands a chance of becoming a valued team member and contributing to the quality of the final product, be it an oral presentation or a written assignment. Also, since during this stage learners repeat the procedure of asking questions and working with Web resources with the purpose of sharing the information, it is hoped that this time they will employ deeper learning strategies and internalize the necessary information.

ConclusionsIt needs to be stressed that the training described above is fairly teacher-controlled, yet in the subsequent research tasks the teacher's control is gradually fading away, with the final objective being to prompt students' automatic use of deep learning strategies. Also, it should be once again explained that after having completed the framing procedure, students are presented with a set of very detailed instructions as to the standards of the final product. This converts the task from open to closed, the reason being that open tasks prove less motivating than closed ones (Jacob, 1996 in Robinson, 2001). It seems that the freedom that open tasks offer, often is often perceived by learners a license to follow the simplest mental route and thus, contrary to teachers' intentions, are likely to result in surface learning. Indeed, observation reveals that despite the training in question, some students persistently employ surface learning strategies, even if this means task distortion and learning pathologies (Kurek, 2005).

The need for the above presented training emerges from the observation that the cognitive potential of the Web, although enormous, all too often is taken for granted, with no sufficient care taken over what learners actually do with Web resources. Literature in the field repeatedly links Web-materials with the promotion of critical thinking skills, yet daily experience shows that having been coached to be surface learners, students unwillingly break old habits and engage in effortful intellectual processing of information. More commonly, they slip into reproduction strategies.

As regards language learning contexts, the question emerges whether making students engage in deep learning results in better linguistic performance. Here it must be remembered that the deeper the intellectual manipulation the more likely it is that students will memorize the material being manipulated. As Robinson puts it, "the greater the cognitive demands of a task, the more they engage cognitive resources (attention and memory), and so are likely to focus attention on input and output" (Robinson 2001:305). Since in Web-based research tasks only authentic sources are used, in theory at least, the linguistic content they contain should be

easily acquired. Indeed, although no research has been done into the rate of language acquisition during deep learning, it seems that learners who use deep learning strategies perform much better, use more sophisticated vocabulary and are able to apply it in more varied contexts.

To conclude, it should be emphasized that the profusion of linguistically authentic electronic texts which are so easily accessible via the Internet creates great learning opportunities. Since they cover a huge variety of topics dealt with in a foreign language, they are inevitably used by students seeking both language resources and factual information. Unfortunately, lack of research skills and deep learning experience frequently results in students' gliding over texts without the internalization of content. This particularly applies to academically struggling students. So, paradoxically, although the informative value of Web resources is well appraised, their abundance, accessibility and lack of external control, if not properly attended, may also lead to the fossilization of inappropriate learning behaviours, especially the surface strategies of mechanical reproduction.

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Notes

[i] Deep learning strategies involve those of synthesis, analysis, evaluation, hypothesizing or decision making.
[ii] Kartoo at www.kartoo.com makes one of the most striking examples here.
[iii] The most representative task is writing in response to other texts which corresponds with Bereiter & Scardamalia's (1987) *knowledge transforming*. In an academic context it is best represented by term paper and thesis writing.
[iv] The concept of well and ill-structured tasks is partially reflected in the distinction between closed and open tasks.
[v] In common view, knowledge is defined as internalised and utilised information.