USING WEB-BASED RESEARCH TASKS

FOR THE PROMOTION OF DEEP LEARNING

by Malgorzata Kurek

College of Foreign Languages

Czestochowa, Poland

gkurek@wsl.edu.pl

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, 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 to learners' general approaches to learning, yet it can also be 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 [1]. 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 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 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 manipulation 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 deeply 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. The unique features of web-resources serving as input for task completion such as information noise, lack of clear structure, linguistic and cognitive authenticity, make them complex enough to foster the use of higher-order thinking skills. 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 much deeper cognitive manipulation of data. The differences in task cognitive complexity are best illustrated by scavenger hunt questions[2].

Question/ task	**Level of cognitive difficulty**	**Cognitive processes involved**
How tall is Mt Everest? Who wrote the book "Peter Pan"? What is another name for bird flu?	simple	Simple factual information retrieval. The answer is usually obtained by means of simple searching strategies. The key words needed are usually those which appear in the original question. The information does not have to be manipulated by the learner.
Which moon in the solar system has active volcanoes? How many Russian Rubles equal one U.S Dollar? Where on the Web can you see the world	medium	The questions require looking for relationships between different concepts. Obtaining the answers calls for well chosen searching strategies e.g. rephrasing (e.g. *money converter*), or combining several terms for precise information retrieval (e.g. "*solar system*"

through the eyes of a honeybee?		*+moon +"active volcano"*)
Find English equivalents of the following Polish proper nouns: - *Sciana Płaczu* (the Wailing Wall) in Jerusalem, - *Głowa Cukru* (Sugar Loaf) in Rio de Janeiro.	cognitively complex	Successful task completion requires activating prior knowledge, looking for the right context, using pictorial clues to compensate for lack of comprehension. Searching strategies are sophisticated and will vary from person to person.

Table 1.Cognitive task sequencing illustrated on the example of scavenger hunt questions.

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[3]. Such tasks share certain characteristic qualities that contribute to their increased cognitive demands. They are enumerated in Table 2 below.

Ř require investigating an issue and solving a problem (Johns 1997); Ř based on external sources either written or oral; Ř interdisciplinary; Ř the problem can be viewed from several perspectives, each of them

affecting the final product; Ř require independent individual work or team effort (whichever the case, teacher's assistance is limited); Ř the learner needs to build on already practiced sub skills – note taking, summarizing, paraphrasing, quoting, writing but also comparing, evaluating (Spack, 1998); Ř 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 solving situation because it is disorganized, with multiple solutions, interpretations and goals available (Halpern, 1996)[4]. 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 intensive intellectual effort and constant manipulation of all the data available.

Obviously, the description provided above shows the desired procedure for tackling research tasks rather than the real one. Successful research work requires well developed research skills and the use of deep learning strategies – the ability that only top students develop on their own. It seems that average and academically struggling students, when placed in a research situation, inevitably turn to the strategies they are best acquainted with, namely the surface strategies of reproduction. As a result, they develop numerous learning pathologies

hindering their learning progress. For instance, task instructions are persistently oversimplified so that they lend themselves well to reproduction strategies (Kurek, 2004). Also, numerous instances of plagiarism or procrastination occur. Once again it needs to be emphasized that it is most evident in situations where students are supposed to work with Web resources, since the intellectual challenge they pose is higher than that created by traditional materials.

It can be assumed that providing learners with sufficient experience and practice with using Web resources would help them develop appropriate research skills. Unfortunately, even casual observation reveals that the majority of web-based tasks do not prepare learners for dealing with research situations. They are either well structured, with detailed instructions as to how to proceed, or they make learners operate on pre-selected, reliable and relevant web sites. Even webquests – web-based and inquiry-oriented long term tasks which have been designed with the purpose of promoting the creative use of web resources, only partially bridge the gap between classroom and real life practices[5]. Carefully designed and described stages of a typical webquest, as well as the pre-selected input that learners are supposed to use, leave students unprepared for the confusion, lack of knowledge and information noise that are bound to occur in real life tasks. Bearing the above in mind, there seems to be a need to provide college learners with Web-infused training that would equip them with strategies for task framing and, consequently, foster critical and purposeful use of Web resources in research work.

Training description

The training in question has been designed for sophomore EFL college students, with the purpose of sharpening their research skills and promoting the use of deep learning strategies. In particular, it aims at teaching students to use Web resources critically and creatively for research tasks and academic writing. Prior to the training, all the participants take part in computer-enhanced literacy sessions during which they learn how to efficiently search for information, evaluate its quality and cite it properly (Kurek, 2002). Thus, in practical terms, the training builds on all the previously learnt electronic and information literacy skills with the focus of transferring them into a new context.

Stage	Activities	Objectives
Stage I: Learning basic electronic tools	- learning basic electronic skills (typing and word processing in general, using email, locating information on the screen), - learning the metalanguage of the environment,	-to make students familiar with working in the electronic environment, -to make students synchronise manual and visual skills for efficient on-screen reading, - to equip students

	- learning software tools: Power Point, Internet Explorer, - adapting Internet materials - working with sound and graphics.	with basic skills in the use of selected software.
Stage II: Developing basic research skills	- learning basic searching tools (search engines) and strategies for complex information search, - evaluating Internet resources in terms of their credibility, validity, attractiveness, authorship, etc. - preparing a webliography, - developing strategies for avoiding plagiarism.	-to make students aware of the existence of various searching tools and searching strategies, - to equip students with criteria for evaluating web materials, - to introduce the concept of copyright and teach the rules of citation, - to make students sensitive to the issue of plagiarism.
Stage III: Teacher-guided research work	- performing a guided interdisciplinary research in which the process of framing ill-structured tasks is stressed - using foundation questions as a means of framing an ill-structured task.	- to introduce students to the concept of cooperative learning, - to make students work with a variety of interdisciplinary authentic texts and use them in texts of their own, - to introduce the

		concept of task framing.
Stage IV: Independent research work	Independent work- performing independent research work, in which a complex interdisciplinary issue is to be investigated from several perspectives.	- to make students combine and use all the previously learned basic electronic and research skills in a new context.

Table 3: Syllabus proposal for the computer-enhanced literacy course.

The process of task framing presented and discussed below belongs to Stage III of the above-presented literacy course. In brief, it teaches students how broad interdisciplinary research tasks can be broken into steps and given an internal structure. Exemplary topics range from *Submarines*, *Volcanoes*, *Deserts of the World* to *Acid Rain*. The procedure for the whole session has been attached in form of a students' handout in Appendix 1, yet due to the limited scope of this article only the process of task framing will be highlighted in the following sections, with the initial stages of topic negotiation and group forming excluded from a detailed analysis. A brief outline of the task framing process is presented in Table 3 below.

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

Table 4. Suggested procedure for task framing.

The idea of training learners in task framing is based on two main assumptions, namely that a research task resembles a problem solving situation and thus inevitably breeds the feeling of confusion, which can be alleviated if learners are able to identify and close gaps in their knowledge (Step 1), and secondly, that the confusion, if not properly tamed, leads to the spontaneous use of surface learning strategies, since they are simpler and less cognitively demanding than the deep ones. In keeping with this, it can be hypothesized that instructing the learner how task perplexity can be successfully curbed is likely to promote deeper and better

learning. In the discussion that follows, the topic *Earthquakes* has been used as an example of any research task which lacks precise instructions and which needs to be structured by the task participant himself.

Task topic : Earthquakes

Step 1: Identifying knowledge gaps.

Instructions for learners:

1. Make a list of basic questions that need to be answered in order to begin your investigation of earthquakes.

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:

Ř What are earthquakes?

Ř Where do they occur?

Ř Why are they dangerous?

Ř 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[6]. 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 2: 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. Also, it fosters their critical thinking skills since it shows the importance of seeing things from alternative points of view.[7]

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 the task framing procedure 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.

The procedure described above usually takes about 50-60 minutes and is followed by a distribution of precise instructions describing the nature of the final product and the assessment criteria. For instance, students learn whether they are supposed to write a report, present a talk show or prepare an itinerary. 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 is often perceived by learners as a license to follow the simplest mental route and thus, contrary to teachers' intentions, may lead to surface learning. Indeed, observation reveals that despite having participated in the training, some students persistently employ surface learning strategies, even if this means task distortion and results in a low quality product (Kurek, 2005). Also, it 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

Conclusion

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, their linguistic content 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 will be 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. Also, numerous instances of web-based plagiarism, especially among academically struggling students, demonstrate the dominance of surface learning strategies. So, paradoxically, although the informative value of Web resources is well appraised, their abundance, accessibility and overwhelming cognitive complexity, if not properly attended, may lead to the fossilization of inappropriate learning behaviours, especially the surface strategies of mechanical reproduction.

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Notes

1. Deep learning strategies involve those of synthesis, analysis, evaluation, hypothesizing or decision making.

2. A scavenger hunt is an information retrieval activity in which individuals or teams search the web for answers to questions on a variety of topics.

4. 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.

5. The concept of well and ill-structured tasks is partially reflected in the distinction between closed and open tasks.

6. More information about webquests can be found at http://webquest.sdsu.edu/about_webquests.html

7. In common view, knowledge is defined as internalised and utilised information.

8. This ability is described by R. Paul (1990) as "strong-sense" critical thinking and represents its highest level. It is contrasted with "weak-sense' critical thinking where the reasoning skills are used in defence of one's own views only.

Appendix 1

Framing research tasks

Students' task sheet

1. Have a look at the titles listed below and circle **all** the topics you find interesting or attractive.

- q Ancient Greece and Rome
- q Cloning
- q The Crusades
- q Submarines
- q Deserts of the World
- q The Himalayas
- q Earthquakes
- q China

2. Find 2-3 people you would enjoy working with.

3. Decide on the topic that all of you would be equally interested in. Once it has been decided upon, write it down in the space provided.

……

4. Cooperate with your group mates to make a list of basic questions that need to be answered to get started.

e.g. What is……?

……..

……..

……..

……..

5. Use the Internet to answer the questions you've just listed. Try to understand the answers rather than copy them.

6. Meet your partners and share what you've learnt.

7. What are the different perspectives you can view you topic from? List them below.

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……..

8. Become an expert! Choose one area of expertise and list the more detailed questions that will guide you in your work. List them below:

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……..

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…….

9. 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.

10. Meet your team mates and share what you've learned.

11. Ask your teacher for detailed instructions as to what kind of product is expected of you.