

Integrating in-class and online learning activities in a healthcare interpreting course using *Moodle*.

Maria Tymczyńska, Department of Translation Studies, School of English, Adam Mickiewicz University, Poznań

ABSTRACT

This paper presents and discusses practical ways in which instructors can effectively combine in-class and online learning activities using *Moodle*, as exemplified by the healthcare interpreting course offered under the Postgraduate Programme in Community Interpreting at Adam Mickiewicz University (AMU), Poznań. It favours a student-centred approach and draws on the *social constructivist framework* (Duffy & Cunningham 1996; Williams & Burden 1997; Benson 2001; Kiraly 2000, 2003), with instructors acting as “organisers, advisers, and sources of information” (Horváth 2007: 104).

Prior to the presentation of selected online resources available for teaching healthcare interpreting (i.e. web sites with 3D anatomy resources, medical glossaries, dictionaries and journals, educational medical videos), this article provides an overview of the healthcare interpreting course design adopted at the AMU, and outlines those practical issues and considerations that should be addressed before integrating online resources into the classroom using *Moodle*: student learning potential, student and context fit, authenticity, practicality, sense of achievement.

KEYWORDS

Healthcare interpreting, Moodle, Course Management Systems, integrated online and in class instruction, social constructivist teaching, student-centred approach.

1. Introduction

This paper presents and discusses practical ways in which instructors can effectively combine in-class and online learning activities using *Moodle*, as exemplified by the healthcare interpreting course offered under the Postgraduate Programme in Community Interpreting at Adam Mickiewicz University (AMU), Poznań. It favours a student-centred approach and draws on the *social constructivist framework* (Duffy & Cunningham 1996; Williams & Burden 1997; Benson 2001; Kiraly 2000, 2003), with instructors acting as “organisers, advisers, and sources of information” (Horváth 2007: 104).

Moodle is a *course management system* that adopts the social constructivist principle and helps teachers enrich in-class instruction with online learning activities incorporating multimedia, such as audio and video presentations and animations, to create an effective collaborative learning environment while addressing a variety of learning styles.

However, technology is useful, only if it is able to provide real benefits to its users. Prior to the presentation of selected online resources available for teaching healthcare interpreting (i.e. web sites with 3D anatomy resources, medical glossaries, dictionaries and journals, educational medical videos), this article provides an overview of the healthcare interpreting course design adopted at AMU, and outlines those issues and considerations that should be addressed before integrating online resources into the classroom using *Moodle*: student learning potential, student and context fit, authenticity, practicality, sense of achievement.

2. The Postgraduate Programme in Community Interpreting at AMU

A course design may draw on a number of complementary theoretical paradigms, as long as they provide the crucial and necessary frame of reference in relation to a particular group of students and the learning context. In the case of the Postgraduate Programme in Community Interpreting launched in 2007/2008 at AMU, the objective was to provide training for community interpreters intending to work primarily in the UK to serve the needs of the Polish community there. The two-semester course comprises a total of 120 hours, and includes lectures on Community Interpreting, Public Life and Institutions in the British Isles, as well as practical sessions devoted to interpreting in such areas as: Economy, Legal issues, Education and Social issues, and Healthcare. Similarly to other practical classes, the healthcare interpreting course in question involves ten 1.5-hour sessions throughout the academic year.

Given the limited time for in-class instruction and the fact that so far the majority of students have had no medical background, it was necessary to design the course in such a way as to provide students with plenty of in-class opportunities to practise healthcare interpreting in a collaborative learning context, and to develop a set of appropriate complementary online resources for self-paced practice that foster student autonomy and intrinsic motivation.

3. Pedagogical background

Consequently, it was decided to complement in-class instruction with multimedia. Multimedia are defined here as “the combination of various digital media types such as text, images, sound and video, into an integrated multi-sensory interactive application” (Neo and Neo 2001: 1). Multimedia can “stimulate more than one sense at a time, and in so doing, may be more attention-getting and attention-holding” (Reeves 1998: 23). While multimedia provide instructional variation and often have a real-world connection that enhances learner motivation and provides a distinct

entertainment value, scholars warn that they should be employed carefully to achieve an effective course design:

Careful application means that in combination with rich communication, an adequate level of interactivity, a high level of congruence of used information types, an adequate use of reference models, and an adequate quality of information representation is implemented (Hoogeveen 1995: 350).

In a similar vein, Meskill notes that while “the perceptions of efficiency and expediency that accompany things technological persist”, the mere use of technology does not ensure a cognitive engagement and productive learning. That author then states that “the power of the medium lies in how well it gets used and integrated” (1999: 141). Naturally, multimedia need to be well-organised and “made available in a way which would guarantee greater efficiency, flexibility and autonomy as an aid to students' training” (Carabelli 1999: 149). Consequently, the Department of Translation Studies at AMU decided to implement a dedicated Course Management System (CMS) to attain the above-mentioned goals.

Course Management Systems are often called Learning Content Management Systems (LCMS) since they help to create, manage, control, retrieve and package a variety of learning resources (Weller 2007: 64). CMSs are used both to support and complement face-to-face instruction (the so-called “blended” learning approach) and to deliver fully online web-based courses. Osguthorpe & Graham (2003: 227) define the blended learning approach as a combination of face-to-face instruction with distance education delivery systems. Ioannou & Hannafin (2008: 46) observe that CMSs are now predominantly used to complement face-to-face courses. It is precisely for this purpose that *Moodle* was adopted at AMU. *Moodle* is a free, open-source online course management system. The acronym MOODLE stands for Modular Object-Oriented Dynamic Learning Environment. Unlike other CMS or VLE (Virtual Learning Environment) systems, Moodle supports a social constructivist framework (read more about the Moodle community at <http://www.moodle.org>).

As Gómez and Weinreb rightly remark, we “should not be deluded into thinking that the mere use of technology will benefit all students”, adding that “to provide our students with a successful learning experience, new pedagogical approaches are needed” (2002: 643). Constructivism asserts that effective learning begins from the learner’s active participation in the learning process and that “knowledge is constructed uniquely within each individual through the process of social interaction” (Benson 2001: 36). According to Meskill, a social collaborative framework for language learning tasks includes the consideration of (1) what knowledge, experience and language learners bring to the task and (2) what “information,

accomplishments, creations, puzzlements, hypotheses, and queries learners take away from the task that can be later used to further learning and collaboration” (1999: 147).

Indeed, Kiraly argues that the social constructivist approach is particularly well-suited to translator training since translator competence can be seen as “a creative, largely intuitive, socially-constructed, and multi-faceted complex of skills and abilities” (2000: 49). He believes that the teaching of translation should be based on “authentic situated action, the collaborative construction of knowledge, and personal experience” (2000: 3). In a social constructivist framework, in lieu of the traditional pattern of teacher-centred class (cf. Kiraly 1995: 10-11), students take part in the learning process through social collaborative processes that value active thinking and action (Duffy & Cunningham 1996). “Based on the ‘constructivist’ theories of such scholars as Vygotsky, Dewey and Bruffee, this perspective sees learning as an interactive, socio-personal process” (Kiraly 2003: 29).

In a social constructivist setting students are increasingly expected to be able to take control and self-direct their own learning. According to the European Commission Directorate-General for Education and Culture, students “must become self-reliant, active searchers for relevant information (...) [and] adopt a more active, motivated, deep and self-regulated learning role” (Barajas et al. 2003: 19). As will be demonstrated in the following sections, *Moodle* is well-suited for developing autonomy and encouraging self-directed learning because it enables students to exercise control over the objectives, content and progress of the learning process.

Increased student autonomy entails increased teacher autonomy. “Autonomous teachers are independent, self-sufficient personalities, who assume ethical responsibility for their teaching. (...) [T]hey act as organisers, advisers, and sources of information” (Horváth 2007: 104). In a student-centred environment, instructors are supposed to act as facilitators of learning by pre-teaching, modelling, controlling, monitoring, offering ongoing encouragement, and, finally, by providing feedback. Thus, the role of the teacher becomes more complex as it involves

the management of the learning environment, the provision of scaffolding techniques, the administration of instruction, the monitoring of feedback, the assessment of student performance and the adjustment of instruction to meet the students’ needs (Neo 2003: 464).

This paradigm—shift from teacher to student-centred instruction—is increasingly reflected in translation teaching using technology:

Teachers are no longer the most important sources of knowledge for their students. Rather, teachers are now guides and counsellors to students who no longer have too little but too much information available and need to know how to manage the situation, how to find what they want in order to tackle whatever task they have in hand at any particular moment (Samson 2005: 102).

The teacher thus provides potential, not final, solutions to translation problems, so that students can acquire a sense of responsibility for the tasks performed and for the process of learning itself. However, it is still the teachers, not the machines, who design and implement contexts conducive to linguistic development. It is their role to clearly formulate student learning outcomes in order to specify

how learning will empower or enable students, reflect intentions that guide teaching and learning, indicate how students can demonstrate skills and knowledge, and suggest how other types of learning such as values and attitudes might be inferred from student choices or actions (Angelelli 2006: 35).

Regarding “other types of learning” mentioned by Angelelli, the emotive aspect of interpreter training in a healthcare setting should not be overlooked. Indeed, Kiraly argues for the application of Krashen’s “affective filter” approach to “stressful communicative situations” in the translation classroom (1995: 29). According to Krashen (1982: 31-32), emotions such as anxiety or low self-esteem may raise the affective filter, i.e. create a “mental block”, and thus prevent efficient processing of the language input. In a healthcare interpreting classroom, students’ affective filter may be raised as a result of the frequently personal and sensitive nature of medical encounters. In order to lower the affective filter, instructors should support students by making them feel engaged in the interpreting process and by creating interpreting environments that mimic natural settings so that students can practise handling their emotions and avoid getting overly involved in a given interpreting situation.

To sum up the pedagogical background of teaching healthcare interpreting at AMU, the tenets of social constructivism and student-centred collaborative instruction have been applied to the service of creating an effective course design integrating contact classes and online activities using *Moodle*. In a social constructivist collaborative learning environment, teachers act as facilitators of learning as increasingly self-reliant students construct and develop their knowledge and skills based on a personalised understanding of the learning content in a given interpreting situation (cf. Nunan 1992; Duffy & Cunningham 1996; Williams & Burden 1997; Meskill 1999; Beatty 2003; Benson 2001; Kiraly 2000, 2003; Neo 2003; Angelelli 2006). In the following sections some practical issues and considerations are presented that should be addressed in order to design an effective healthcare interpreting course, integrating online resources into the classroom using *Moodle*.

4. Structuring the healthcare interpreting course

Healthcare interpreting (also referred to as medical interpreting or included in the term community interpreting) has been the focus of numerous studies which have indicated some of the complexities and challenges characteristic of this specific setting (cf. Angelelli 2004a, 2004b, Pöchhacker and Shlesinger 2007). Angelelli (2006: 25) has identified the following types of interpreting skills which should be trained in healthcare interpreting education (HIE):

1. *cognitive processing skills*, i.e. split-attention, note-taking;
2. *interpersonal skills*, i.e. making students aware of their position in the triadic interpreting setting, including issues such as visibility, neutrality, power-relations, interpreter responsibilities and duties (cf. Leanza 2007: 29-30 for a typology of community interpreter roles; cf. Hale 2007:41-60 for a summary of controversies about interpreter roles in the medical setting);
3. *linguistic skills*, i.e. specialist medical vocabulary, paying attention to registers;
4. *professional skills*, i.e. ethics, professional rules and regulations; (cf. Tebble 1998 for a detailed account of the contract and its ethical components; cf. Bot 2007 and Dubslaff & Martinsen 2007 for studies of the direct mode of interpreting in healthcare settings)
5. *setting-specific skills*; i.e. using the required terms and expressions in a given setting;
6. *sociocultural skills*, i.e. developing interpreter interactional competence with regard to factors such as gender, age, ethnicity, the socioeconomic status, and socio-cultural norms of the setting.

Teaching healthcare interpreting should take into account those complex issues and challenges by designing well-structured interpreting tasks based on case studies that mirror real-world conditions (for a summary of case-based instruction in medical education cf. Williams 1992; for a practical account of implementing problem-based learning in medical education cf. Kaufman 1985; for a historical overview of task-based instruction in foreign language teaching cf. Willis 2004: 3-44). Therefore, practical interpreting classes at AMU are based on *triadic exchanges* (i.e. bilingual interpreter-mediated, cf. Hale 2007: 12) featuring a healthcare provider, a patient and an interpreter. In accordance with the social constructivist, collaborative and student-centred framework, students are “put into a semi-autonomous situation in which they are faced with a task, a question, a problem” (Beatty 2003: 103). In the healthcare interpreting class at AMU students are put in a communicative situation in which they must resort to a context-appropriate medical discourse and jointly make decisions affecting the outcome of the

conversation. The following is the structure of a typical class combining synchronous and asynchronous learning activities:

1. *Home Preparation*: students watch several introductory videos on a given subject matter (usually not exceeding 4 minutes), read the attached transcripts, analyse new vocabulary, aided by online bilingual and monolingual dictionaries, and perform a short comprehension check;
2. *In-class*: students analyse selected medical cases, followed by interpreting scripted role plays (prepared by the instructor and reflecting real-life situations) and unscripted role plays (students are given scenarios on which they base their parts), note-taking being limited to a minimum. Every role play consists of two stages: a trial enactment in groups of three (healthcare provider – interpreter – patient), and (for selected groups) an enactment in class followed by a feedback session. There is an average of three role plays per class, which means that everybody has a chance to practise all roles. Moreover, students are always given a time limit to complete all activities;
3. *After-class*: students can access and download the materials used in class; the materials are usually divided into two folders: “obligatory” and “extras” (including additional online readings, self-assessment quizzes, images, animations and video presentations).

As can be seen from the typical class structure outlined above, most of the in-class time is devoted to role plays, discussion, questions and interpreting exercises, thereby fostering the development of the aforementioned HIE skills (Angelelli 2006). These skills can be fine-tuned in-class thanks to moving most of the content delivery online using *Moodle*. A detailed account of integrating online resources into *Moodle* is presented in the following section.

The healthcare interpreting course at AMU is divided into ten blocks of 1.5 hours each and consists mainly of role plays designed to mirror real life triadic exchanges in a healthcare setting. However, as students are generally unfamiliar with medical terms, the first two weeks of the course are devoted to acquiring background knowledge of medical terminology and phraseology. As observed by Wakabayashi,

a lack of formal medical training is not necessarily an insurmountable obstacle to the budding medical translator. What is essential is not a medical degree, but a broad understanding of the fundamentals and a knowledge of how to acquire, in the most efficient manner, an understanding of other elements as and when necessary (1996: 357).

The syllabus of the healthcare interpreting course is presented in Table 1:

Class	Topic
1.	The NHS. Hospital organisation. Ward equipment. Types of drugs. Common abbreviations. Irregular plurals.
2.	Obtaining case histories. Common symptoms. Physical examination. Sample laboratory test. Common diagnostic and surgical procedures. Prescriptions and medications.
3.	Selected case histories 1: Chest pain, Cardiac arrest, Myocardial infarction
4.	Selected case histories 2: Knee injury, Ankle sprain, Hand injury (laceration), Fractured neck of femur
5. 6.	Selected case histories 3 (double class): Pregnancy and labour (complications).
7.	Selected case histories 4: Childhood immunisations. Contraception 1.
8.	Selected case histories 5: Common childhood conditions. Contraception 2. STDs
9.	Specialist consultations: neoplasms, diabetes.
10.	MOCK EXAM

Table 1. Healthcare interpreting at AMU – course syllabus

The final meeting consists of a performance exam which tests students' interpreting ability and skills in a given interpreting setting. Thus, continuous assessment methods based on online class preparation and in-class role plays (cf. Fowler 2007 on formative assessment in interpreter training) are accompanied by a summative evaluation component. This is in line with Angelelli (2006) who asserts that assessment should be meaningful, aligned with course objectives, student learning outcomes, and chosen methodology.

After implementing the course design outlined above, students have been found to take an active part in the learning and interpreting process. Such a course provides the necessary exposure to medical discourse and its active use in a variety of interpreting settings. As students practise by assuming the roles of healthcare providers, patients and interpreters in role plays, they employ a variety of linguistic expressions in different registers, they can benefit from both instructor and peer feedback, and they are given a chance to reflect on their performance in a given communicative setting. This formula enhances their confidence (thereby lowering the affective filter) and promotes an active, learner-centred and collaborative development of the HIE skills.

The adoption of the pedagogical framework and methodology outlined above means, however, that individual classes (both face-to-face and virtual) need to be properly planned and managed. The following section presents the functionalities of *Moodle* and the advantages it offers to course instructors and students alike. It also examines some issues and considerations that should be addressed when integrating online resources into the healthcare interpreting classroom using *Moodle*.

5. Integrating online resources into the classroom using *Moodle*

Moodle operates on a click-and-go principle. It offers about 20 customisable activities (e.g. adding multimedia, quizzes, online assignments and questionnaires). It has a modular design, which means that adding new activities and managing the course itself is almost intuitive. Instructors can easily integrate text, graphics, animation, sound, and video. Activities, sections and blocks can all be simply dragged-and-dropped. Moreover, the navigation bar displays hyperlinks showing where the user is in relation to the main site so that he or she can return to the previous screen at any time (*Moodle* tutorials available at <http://moodle.org/>, cf. also Brandl 2005).

One of the advantages of Course Management Systems like *Moodle* is that they provide students with a twenty-four-hour access to course information. Students can readily download course materials such as: syllabus, course content materials, useful links, etc. Students can also access latest course information at any time. *Moodle* offers many benefits to instructors as well: course materials may be continuously revised and updated in order to tailor them to student needs. Instructors may upload a varied didactic content to enable students to integrate the information more effectively while catering to a variety of learning styles (cf. Leaver et al. 2005: 65-81), namely:

- Visual Learners who benefit most from visual displays including: pictures, diagrams, illustrations, videos;
- Auditory Learners who learn through listening to audio and video materials;
- Tactile/Kinaesthetic Learners who profit from doing interactive online exercises and self-assessment tests.

More importantly, new blocks, models, and activities may be uploaded but hidden from view. They can be made available when required in order to ensure an adequate level of student involvement. This solution gives more flexibility to teachers, without overwhelming students with too much information at a time. It should also be underscored that *Moodle* resources are reusable and may be improved upon on a continuous basis. Thus, *Moodle* offers numerous benefits for both students and instructors in terms of course management: fast and easy access to course materials, continuous updates,

flexibility and, ultimately, an enhanced learning and teaching experience and, above all, the transfer of knowledge.

While there is a plethora of good quality and free online resources available to instructors teaching healthcare interpreting that may be made available to students with relative ease using *Moodle* (a list of selected online resources for healthcare interpreting may be found in Appendix 1), there are some issues and considerations that should be borne in mind when integrating online resources into face-to-face classroom teaching.

The key principle when designing a course combining online and in-class activities is that “pedagogy must drive the technology and not vice versa. Technology is an important tool, but as with any tool, it is useful only if one knows how to use it advantageously” (Gómez & Weinreb 2002: 643). Just because it is possible to upload yet another educational video or try out some new features in *Moodle*, it does not mean that one should do it or has to do it. The Internet is replete with different resources and *Moodle* itself is a very robust software. However, the point is not to create a cutting-edge website but to ensure the efficacy of the learning process. The following list offers some useful criteria for evaluating the applicability of online resources:

1. student learning potential: the degree of opportunity for presenting and practising new medical vocabulary in a meaningful context; the degree of student involvement in authentic and challenging case-based communicative environments (cf. Williams 1992);
2. student and context fit: the extent to which materials are appropriate and relevant to the given student and context characteristics;
3. authenticity: the degree to which authentic resources are used; the degree to which students will be able to see a tangible connection with the real interpreting world;
4. practicality: “just as is true when panning for gold, trying to find exactly what you are looking for on the Web can be frustrating, challenging, and time-consuming” (Warschauer et al. 2000: 22) and teachers sometimes “simultaneously wear the hats of materials creator, technical trouble-shooter, and classroom teacher” (ibid. 76-77). Thus, the amount of time and effort necessary to research, upload and monitor a given multimedia task or complete an activity online should be considered;
5. sense of achievement: the degree to which students may feel satisfied with their learning outcome after completing a given task; the degree

to which instructors feel satisfied with the quality, appropriateness and relevance of online resources to a specific topic in relation to the time and effort needed to integrate it with the syllabus.

Moreover, it should be remembered that the numerous advantages of online resources are often offset by inactive or broken links. Internet sites change addresses, and sites may be temporarily or permanently unreachable. In order to counteract this problem, it is necessary to check links to sites regularly to see if they are still functioning. As Lynch remarks, “[a]ccess to medical terminology resources via the internet, including multilingual as well as monolingual resources, offers the advantages of immediate availability, cost-effectiveness, interactivity and powerful search capabilities” (1998: 148) but he adds that those advantages are often offset by “the relative instability of [Internet] sites (servers that are temporarily inoperational, pages that have moved, links that are not updated)” (*ibid*: 160).

6. Conclusions

Peter Drucker is quoted as saying that in order for a new technology to be successful, it must do the old job ten times better (Twigg 1994). However, as it appears that no study showing conclusively the validity of the above assertion has been available to date, it is felt appropriate at this juncture to emphasise that, from the practical experience of the author of the present paper, traditional interpreting classes certainly benefit from including on-line learning components in them.

The opportunities offered by multimedia tools are extremely stimulating and challenging for interpreting teachers. Though direct contact between teacher and students in the classroom is obviously a *sine qua non* for successful training, the possibility of supplementing information, suggestions and material offered during classes (...) is of invaluable help (Gran et al. 2002: 278).

The Internet and Content Management Systems such as *Moodle* are capable of supporting both students and instructors in creating collaborative learning communities in which students can exercise autonomy through self-directed out-of-class learning, but they are only useful if applied for the purpose of achieving an effective course design. It is our task to help students feel a part of the technology and not just its mere receivers. Therefore, when choosing how to combine online and in-class instruction, we should be aware of both the advantages and potential pitfalls of using the latest technological advances. When designing a course incorporating multimedia with the help of a course management system, it is useful to consider such issues as: student learning potential, student and context fit, authenticity, practicality, sense of achievement. It is also important to keep the learning outcomes in

focus, and to provide students with regular feedback and appropriate assessment methods.

Healthcare interpreting at AMU is still a relatively young course and, as such, it is open to future changes and modifications in line with experience and market expectations. Indeed, one of the main challenges faced by course organisers relates to

deciding on the most relevant course content and the most efficient teaching methodologies (...) No course can claim to cover all the areas necessary to train students adequately for the complex task of Community Interpreting (...) The duration of the course will determine how much it can cover. Therefore, course designers are always forced to prioritise when choosing what to include (Hale 2007: 169).

It is nevertheless felt that a successful integration of Moodle in the in-class and online learning activities along the lines indicated in the present paper should prove, by virtue of its learning process enhancement features, to be a most useful and rewarding experience for students and instructors alike.

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APPENDIX 1: Selected monolingual and bilingual online resources for teaching healthcare interpreting (all websites consulted on 8 February 2009)

1. Medical glossaries, dictionaries, pronunciation guides, terminology tutorials:
 - Polish-English and English-Polish online medical dictionary by *Medline* available at <http://www.bioling.com/en/slownik.php?s=en>
 - *Merriam-Webster's* medical dictionary at <http://medical.merriam-webster.com/medical/Enter%20a%20word%20or%20phrase...>
 - *Merck's* pronunciation guide at <http://www.merck.com/mmhe/resources/pronunciations/index/a.html>
 - The Medical Terminology website at <http://ec.hku.hk/mt/> offering guidelines on medical terminology, self-assessment tasks, a pronunciation guide, a glossary and a search engine

2. 3D anatomy atlases, models and animations
 - <http://www.msd-control.com/services/emed/english/regions.html> is a site where students can view 3D anatomical models of different regions and systems of the human body. Not only can they rotate or magnify the images, but also save them to their computers. Moreover, if they move the cursor up and down over the image while holding down the left mouse button, they can dissect the model to its various levels. The site is offered by Merck & Co., Inc., known internationally as Merck Sharp & Dohme (MSD) – there is also a site in Polish: <http://www.msd.pl/content/corporate/index.html>
 - <http://www.innerbody.com/htm/body.html> is a perfect place for students to explore the different systems of the human body – they are invited on a self-guided tour of the human body and welcome to watch various animations, like the one of the cardiovascular system at <http://www.innerbody.com/anim/card.html>. The site is offered by MyHealthScore.com, a division of Intellimed International, <http://www.intellimed.com/>

3. Educational medical videos and interviews including transcripts:
 - educational medical videos available from the NHS at <http://www.nhs.uk/video/Pages/MediaLibrary.aspx> (currently 240 videos available)
 - <http://video.about.com/health.htm> presently offering 274 readily accessible health videos

4. Specialist medical journals like *The Lancet* at <http://www.thelancet.com/> or the *British Medical Journal* at <http://www.bmj.com/>

5. Websites such as *Merck* (<http://www.merck.com/mmpe/index.html>) or *MedlinePlus* (<http://www.nlm.nih.gov/medlineplus/>) offer extensive information about drugs, illustrated medical encyclopaedias or manuals, interactive patient tutorials, and the latest health news.

Biography



Maria Tymczynska teaches healthcare interpreting on the Postgraduate Course in Community Interpreting at the Adam Mickiewicz University of Poznan, Poland, where she is a PhD student in the Department of Translation Studies. Her main research interests lie in the psycholinguistics of translation and the role of new technologies in translation and interpreting didactics. She can be reached at tymczynska@ifa.amu.edu.pl