

APPLICATION OF SENSORY MODALITIES IN A LANGUAGE LEARNING DIAGNOSTICS

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Highlights

- Adaptive eLearning, adaptive instruction, sensory modalities, a learning style

Abstract

This paper describes a theory of adaptive eLearning, a tool that enables an individualised instruction. First part of the paper focuses on a research review in the area of adaptive eLearning. Next, a theoretical model of adaptive eLearning is introduced.

The paper also deals with a possibility of adaptive eLearning use in a language learning relating to sensory modalities application in a language learning diagnostics.

Firstly, sensory modalities has been chosen from a basic classification of learning styles in a language learning. Moreover, a design of diagnostic placement test is presented along with characteristics of testing tasks with some of their examples. Secondly, the authors address content validity and reliability testing and scoring of the diagnostic placement test respecting recognized standards.

Last but not least, there is a reference to a suitable adaptive environment for general subjects instruction and a language learning diagnostics following student's dominant sensory modality which is explained in more details.

The diagnostic placement test is aimed to be a part of adaptive eLearning instruction system which is being designed and created at the Department of Information and Communication Technologies, Faculty of Pedagogy, University of Ostrava.

Keywords

Adaptive eLearning, adaptive instruction, Common European Framework of Reference (CEFR), constant student's characteristics, a Diagnostic placement test (DPT), dynamic student's characteristics, a learning style, sensory modalities

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Introduction

Regarding the changing environment in terms of using information technologies, there has been many attempts either from academic field or business field to use information technologies in learning instruction. As a reaction to these attempts there has been a project carried out at Ostrava University, called 'Adaptive individualised learning in eLearning' from 2009 to 2012. The aim of this project was to design a theory of adaptive eLearning, which meant to define the function of so called 'intelligent virtual teacher' that adapts the learning process automatically to students' personal knowledge and characteristics. Before the topic will be fully discussed several questions should be answered. These are as follows:

1. What needs to be detected about a student to start effective adaptive learning?
2. How do we detect the information about a student?
3. How shall we teach in adaptive eLearning?
4. How shall we define a structure of teaching support to be adapted according to student's characteristics?

While trying to answer these questions, other problems can be expected to appear.

In the Czech Republic the topic of adaptive eLearning has been discussed very little so far (2012). One example for all: Karel (2006) deals with the area 'Adaptability in eLearning'.

However, the topic has been discussed in a wider range abroad. Brusilovsky (2003) has been doing research for almost 20

years in the area of adaptive systems. In 1996 he published the article called 'Methods and techniques of adaptive hypermedia' which is the summary of knowledge about adaptive hypermedia until 1996. From his perspective adaptive system to be called adaptive must contain hypertext or hypermedia. What's more, there must also be a user platform and the hypermedia must be submitted to this platform. Brusilovsky also divided adaptive techniques in adaptive navigation and adaptive presentation. The idea of Brusilovsky approach to adaptive system can be seen in Figure 1.

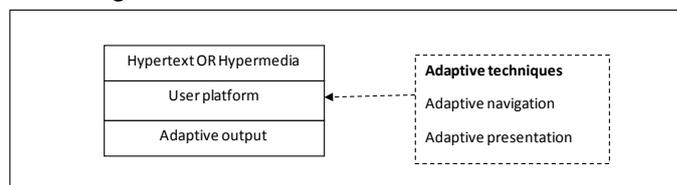


Figure 1: The idea of adaptive system from Brusilovsky perspective

From his many publications it is clear that the field of adaptive hypermedia systems has begun to be oriented on learning styles. Furthermore, web adaptive systems has been here for a long time. The first generation was based on adaptive presentation and adaptive navigation as mentioned above. They were focused on users' knowledge and objective simulation. The second generation of web adaptive systems widened the research field of adaptive hypermedia to explore an adaptation of content

choice and adaptive recommendation based on users' interests. The third 'mobile' generation pays attention to the place adaptation, time and a computer platform for general model and how to individualise widespread information technologies to user's needs (Brusilovsky, 2003).

The issue of adaptive instruction also appears in the article called 'Behaviour Based Adaptive Navigation Support' (Holub and Bielková, 2010). In the article the authors introduce the method how to support adaptive navigation and hypertext links in adaptive systems. Next article 'On the impact of adaptive test question selection for learning efficiency', by the same authors, informs about the method of adaptive selection of test questions according to individual student's needs in a web educational system.

The theoretical review above shows adaptive instruction has been widely discussed issue but it has been solved partially so far (adaptive navigation, adaptive presentation, adaptive selection of test questions, etc.).

The current findings must have been taken into account when designing a model of adaptive eLearning. The model is based on finding initial student's characteristics, creating adaptive study support and defining adaptive algorithms.

In the field of a language learning individualised approach has been discussed on the level of 'Computer language learning' (CALL), 'Mobile assisted language learning' (MALL) and 'Intelligent computer assisted language instruction' (ICALI).

In the field of a language knowledge testing terms as 'Computer assisted language testing' (CALT) or 'Computer based language assessment' (CBLA) appear. When talking about adaptivity in a language knowledge testing the term 'adaptive test' is used. The test detects a language level of a student in a way of submitting an easier or more difficult tasks on the base of student's answers (Fulcher 2010).

To create adaptive teaching materials in a language learning a theoretical basis for a design of multimedia language projects can be used. The core of any adaptive teaching materials should be the Second language acquisition model (SLA model). Long (1996) mentions the SLA model to be based on Krashen's idea who defines entries when learning a target language and how this entry to be processed by a student to influence his language skills positively.

The paper's objective is to introduce approach of application of sensory modalities in a language learning diagnostics in a continuity of Ostrava University project called 'Adaptive individualised learning in eLearning' where theoretical basis for adaptive eLearning of general subjects has been defined. The current model of adaptive eLearning must have been slightly adjusted for a language learning instruction. First adjustments are introduced in this paper in the form of detection of a student's characteristics together with existing language knowledge to begin an adaptive language learning process.

Materials and Methods

The system of adaptive instruction has been developed to serve adaptive general subjects instruction. General subjects are considered to be subjects like mathematics, biology etc. The system itself is comprised of 3 modules: an AUTHOR module, a STUDENT module and a TEACHER module. The AUTHOR module includes all the work connected with a design of adaptive study material. In the STUDENT module student's characteristics and a learning style is being diagnosed. Lastly, the TEACHER module controls the flow of adaptive study

material based on detected student's characteristics and his learning style. The system of adaptive instruction is presented in Figure 2.

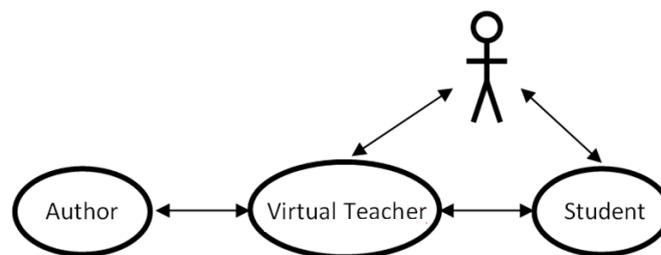


Figure 2: Adaptive instruction model

In the STUDENT module constant and dynamic characteristics of a student are detected both for general subjects as well as a language instruction. However, constant and dynamic characteristics differ in the content.

Constant characteristics detection for general subjects instruction is much more complex in comparison to constant characteristics detection for a language learning instruction. The difference in both approaches is discussed in more details in 'Discussion' section. The authors of original STUDENT module decided to design the particular elements in constant characteristics category to be more complex for the reason not to have such a clear guideline for choice as it exists in a language learning.

Furthermore, they aimed to include as many constant characteristics as possible to ensure at least some of chosen characteristics will help students to acquire better study results.

However, constant characteristics detection for a language learning instruction has been simplified and only sensory preferences has been chosen as a character of a study content in a language learning is structured by four language areas (reading, listening, writing and speaking. Proving the existence of interconnection between sensory modalities and particular language areas is a subject of further research described at the end of 'Discussion' section.

In the module STUDENT for general subject instruction there are three categories to detect student's characteristics (constant, variable and continuous monitoring of study activities). STUDENT module for a language learning instruction contains two categories only. These are constant and variable characteristics. These student's characteristics are aim to be acquired by a diagnostic placement test (DPT). The test detects both constant as well as dynamic characteristics of a student in one go.

The test has been designed respecting the language areas classification of the Common European Framework of Reference for Languages (CEFR) and analysis of learning styles and characteristics of a student.

It was also necessary to pay attention to result accuracy given by the DPT. The idea was to get a result about student's characteristics and existing language knowledge from all areas of a language at one go. Taking this fact into account there was a research carried out to detect how to acquire data about student's characteristics either by a psychological questionnaire or a placement language test to get more relevant data.

On the base of selected student's characteristics of a student, language areas and the research results a diagnostic placement test has been designed respecting the test reliability and scoring and content validity based on recognized standards.

Common European Framework of References for Languages (CEFR)

Common European Framework of References for Languages (CEFR) defines language competencies on each language level. These language levels are:

- A1 Beginner/elementary
- A2 Pre-intermediate
- B1 Intermediate
- B2 Upper-intermediate
- C1- C2 Advanced

Language skills according to CEFR are divided in two main areas. They are categorised and described as skills and are the subject of development by each student individually (Ivanová et al, 2002).

<i>Receptive skills</i>	<i>reading and listening</i>
<i>Productive skills</i>	<i>Speaking and writing</i>

Table 1: Language skills by CEFR (simplified version)

In Table 1 language skills of a student are divided into *receptive* and *productive* skills. By *receptive skills* we understand a language in a written and audio form. *Productive skills*, on the contrary, are meant to be language skills of a student to be able to express his ideas in both spoken as well as in a written form.

Analysis of learning styles and student's characteristics

Before the diagnostic placement test design, analysis of learning styles and student's characteristics must have been done so as to choose the most relevant learning style of a student or his characteristics to match language areas. The whole idea is presented in Table 2.

Shimojo and Shams (2001) divided learning styles in the three main categories. First category is called 'sensory preferences' also called 'sensory modalities'.

Visual, auditive and kinaesthetic students belong to the first category. Felder and Henriques (1995) define another type of a student which is called a verbal student. The speech of a verbal student is a reaction to what is heard or read. The authors also claim a kinaesthetic student to be more psychological type similar to introvert/extrovert category of Jung typology. On top of that, Friedman and Alley (1984) puts another type in sensory modalities category which is called visual-linguistic type. This type of a student likes to get information from a text reading and his knowledge is consolidated by a written form.

In 'Multisensory structured language teaching' visual, auditory and kinesthetic-tactile pathways are engaged simultaneously to enhance memory and learning of a written language by students with dyslexia (Henry, 2009).

Vaseghi, Ramezani and Gholami (2012) have compiled past studies conducted on students' learning styles in a language instruction. In the paper they mention research results carried out on a worldwide level, in particular using Reid's Perceptual Learning Style Preference Questionnaire (PLSPQ) or VARK Learning Styles Model.

The second category is called 'psychological types'. Besides Shimojo and Shams (2001). Cohen and Weaver (2005) divide the psychological types in extrovert/introvert, random-intuitive/concrete-sequential and closure-oriented/open-oriented types.

Sadeghi et al (2012) review the relationship between learning styles, personality and reading comprehension in a language learning.

The third category is called 'cognitive learning styles'. By cognitive styles we mean the way of thinking, understanding and knowledge retention. Cohen and Weaver (2005) defined cognitive learning styles as global/particular, synthesizing/analytical, sharpeners/levelers, deductive/inductive, field-dependent, field-independent, impulsive/reflective, metaphorical/literal types.

More to say, sensory modalities are not separate modalities: plasticity and interactions have been found by neurobiological research done by Shimojo and Shams (2001) which supports suggested idea to help students with weak test results in one area of language by dominant sensory modality of a student.

A University of Pennsylvania psychology study (Thompson-Schill, Kraemer and Rosenberg, 2009), using functional magnetic resonance imaging (fMRI) technology to scan the brain, reveals that people who consider themselves visual learners, as opposed to verbal learners, have a tendency to convert linguistically presented information into a visual mental representation. In contrast those participants who considered themselves verbal learners were found under fMRI to have brain activity in a region associated with phonological cognition when faced with a picture, suggesting they have a tendency to convert pictorial information into linguistic representations.

Oxford and Ehrman (1992) have been dealing with learning styles in a language learning and matched a visual type of a student with the 'reading' language area.

Felder and Henriques (1995) add a comment to visual type of a learner who should learn better if he can see the new words first and then he hear them. The same happens with the auditive student but in a different order. By different order is meant to listen first and then to see the new words.

Oxford (in Felder and Henriques, 1995) confirms visual students to have a good ability to percept information from printed text plus other visual stimulus. On the contrary, visual students don't prefer written and spoken words but verbal students do.

Oxford (2003) claims that auditive students don't depend on visual support to understand what is said but it is not a rule. They prefer discussion and role-plays in the classroom and sometimes they have problems with written form of a task given.

Research introduction on how to test student's characteristics and a language level

The objective of intended research is to learn if it is of some benefit to place students in different study groups not only according to their language level but also according to their preferred sensory modality. The positive effect of this research is seen mainly in findings if students placed in different language level groups together with their preferred sensory modality will learn faster and with knowledge better retained. If the approach mentioned above does not bring positive results, it will signify that students' classification respecting to their preferred sensory modality does not positively impact their study results and thus should not be employed in a language learning instruction improvement.

Nowadays, a grammar placement test is used to classify an existing language level of a student which is considered to be sufficient for further language learning. Even highly recognized institutions in the field of a language learning and testing, for example Oxford University Press, which is a department of the University of Oxford, supports this way of testing. There are

recognized grammar placement tests sold by the university all around the world.

This fact shows outcomes making further study of a student difficult in other language areas as speaking, writing, reading and listening. Learning a foreign language is not only about grammar language level. As a result, all student's initial language skills are placed into one language level which doesn't correspond with reality of student's language knowledge across all language areas.

From my perspective, before students undergo adaptive language instruction (accommodated electronically), they take DPT and their 'real language level' is detected. Based on these test results, study materials matching preferred sensory modality of a student will be presented to him and a language area showing weak results will be supported by dominant sensory modality. The main idea presented above is to discover a language level of a student in all language areas and making a further study of a student more effective in a way of speed and knowledge retention.

As a reflexion to these considerations a research was carried out in 2011 to bring results about possibility to use a language placement test to get information about student's sensory modalities and a language level from all language areas (which is reading, listening and writing) at one go. Testing of speaking skills is not included in DPT as current information and communication technology possibilities in language productive skills testing are very limited but not impossible. Recording student's voice and saving student's writing tasks into a database of adaptive eLearning for teacher's subsequent review is possible. However, not to omit testing of productive skills in adaptive eLearning completely, writing skills testing and learning has been retained which appeared to be less complicated in comparison to speaking skills testing and learning in the light of the whole issue discussed in this paper.

A psychological questionnaire acquiring information hasn't seemed to be a good choice because questions from psychological questionnaires return biased answers. On the contrary to psychological questionnaires, language tests return unbiased and measurable answers. A comparative research has been carried out where a psychological questionnaire and a language placement test has been used. The psychological questionnaire tested sensory modalities. Alongside with the psychological questionnaire the sensory modalities were tested using a language placement test covering language areas (listening, reading and writing). It has been done so because it is supposed that a language placement test covering all language areas will also reflect sensory modalities of a student. The presumed interconnection between sensory modalities and language areas is represented in the Table 2.

Language placement test areas	Sensory modalities of a student
Reading	Visual-linguistic type Friedman and Alley (1984)
Listening	Auditive type Oxford (2003)
Writing	Verbal type Felder and Henriques (1995)

Table 2: Interconnection between language placement test areas and sensory modalities of a student

Comparing results of a psychological questionnaire and a language placement test, there must have been a minimum request set for a correspondence between the psychological questionnaire and the language placement test results. The minimum request was set to 90% and higher which is considered to be a credible outcome.

Questions being part of used the psychological questionnaire were created by a psychologist Novotný (2010) and tasks for the language placement test were taken over from Test and Assessment CD-ROM which is a part of NEW ENGLISH FILE textbooks published by Oxford University Press.

The CD-ROM includes tests in a DOC format for teachers and can be adjusted according to teacher's needs. Reliability and content validity of testing tasks from this CD-ROM have also been surveyed.

Grammar school students and art secondary school students aged 15-18 years were the respondents in discussed research.

Design of a diagnostic placement test in a language learning

Table 3 shows the specifications preceding design of a diagnostic placement test in adaptive eLearning. The specifications for the test has been chosen on the base of didactic tests systemized by Chrástka (2007).

Classification standpoint	Test type
Characteristics of performance	The test measures a language level
Quality of a test preparation	Quasi-standardized
Characteristics of tested activities	Cognitive
Type of knowledge tested	Study results
Result interpretation	The test detects particular results (absolute performance)
Type of testing	Placement testing
Topic range	Summarizing
Objectivity of scoring	Quasi-scoring

Table 3: Classification standpoints to design a diagnostic placement test in adaptive eLearning

Diagnostic placement testing tasks reliability

Some standardized steps has been done to make testing tasks more reliable.

First, in multiple choice tasks (listening tasks and reading tasks) we put one extra option that excludes all the other options (option 'doesn't say' or 'none of the presented answers'). Respecting this approach a student will be motivated to think more deeply about the right answer.

Second possible approach to eliminate the negative effect of guessing is application of correction on guessing formula by Frary (1988) stated in number 1.

$$S = R - \frac{W}{n - 1} \quad (1)$$

where

S= the score

R= the number of right answers

W= the number of wrong answers

n = the number of alternatives per item

To say it in more details, if I take a twenty-items, four option multiple-choice test and I score 12, the final result would be as you can see in formula 2, 3 and 4.

$$S = 12 - \frac{8}{4 - 1} \quad (2)$$

$$S = 12 - 2,67 \quad (3)$$

$$S = 9,33 \quad (4)$$

Diagnostic placement test reliability and scoring

Test reliability depends on quality and number of testing tasks. In the field of pedagogical diagnostics a coefficient 0,80 is required that means when the test is given to a student for the first time and for the second time, the results shouldn't differ more than max. 20% according to Chrástka (2007).

Binary scoring will be applied for this type of the test. It means 1 point for a correct answer and 0 point for an incorrect answer. No points are deducted for an incorrect answer. Exception will be applied in the grammar placement test as the test contains 20 questions. For the reason of total score of 10 points in all language areas, there will be 0,5 point for 1 correct answer.

Diagnostic placement test content validity

Testing tasks will represent a knowledge at certain language level.

DPT will include listening tasks, reading tasks, written tasks and grammar tasks in defined language levels according to CEFR (Common European Framework of Reference for Languages) standard.

Testing tasks are copied from Oxford University Press (OUP) testing materials CD-ROM for New English File book series. These tests are allowed to be modified by teachers for a testing purpose.

Results

Results on analysis of learning styles and student's characteristics

Learning styles corresponding with particular language areas (reading, listening, speaking and writing) has been chosen from the classification of learning styles. These are sensory modalities as a visual-linguistic learner, an auditive learner and a verbal learner. These sensory modalities will be used to design a diagnostic placement test.

Research results on how to test student's characteristics and a language level

Totally 130 psychological questionnaires together with language placement tests have been handed out and filled in a relevant way by students. The purpose of this research was to find out which of these tools either a psychological questionnaire or a language placement test returns more relevant results about sensory modalities of a student. The results are as follows:

Personal type in the psychological questionnaire/ Language areas in the language placement test	Total number of students (tests filled in correctly)	Result correspondence: the psychological questionnaire and the language placement test	Result correspondence in %
Audial type/ Listening test	130	89	68
Visual type/ Reading test	130	56	43
Verbal type/ Writing test	130	97	75

Table 4: Presentation of research data

From the Table 4 it is clear that a correspondence of 90% between results of the both tests doesn't exist. The research proved the supposition that a psychological questionnaire isn't a suitable tool to define a personal type of a student, in our case, sensory modalities of a student. For this reason other tool returning more relevant outcomes about sensory modalities is needed. This tool is considered to be a designed diagnostic placement test.

Results on design a diagnostic placement test in a language learning

Based on analysis of student's characteristics, classification of language skills according to CEFR standard and the research comparing a psychological questionnaire and a language placement test results, a diagnostic placement test for adaptive eLearning has been designed. You can see the placement test below in Figure 2. In Figure 3, 4 and 5 there is a design of testing tasks.

In Figure 2 the diagnostic placement test is presented. The whole diagnostic process begins in the STEP I.A. In this step students are navigated to the next dialog box in the STEP II.A where they are instructed to choose their current knowledge of grammar at their discretion. In the STEP II.A there are hyperlinks to grammar tests based on a difficulty language level. In this step a student's grammar language level is diagnosed. In the STEP III.A students undergo listening, reading and writing placement test to detect their current language knowledge of remaining language areas. These results are also aimed to reflect sensory modalities of a student. In addition, more detailed explanation of one part of the test from the STEP III.A is demonstrated in the STEP IV.A. Finally, in the STEP V.A we can see an example of a student's language knowledge result also reflecting sensory modalities of a student.

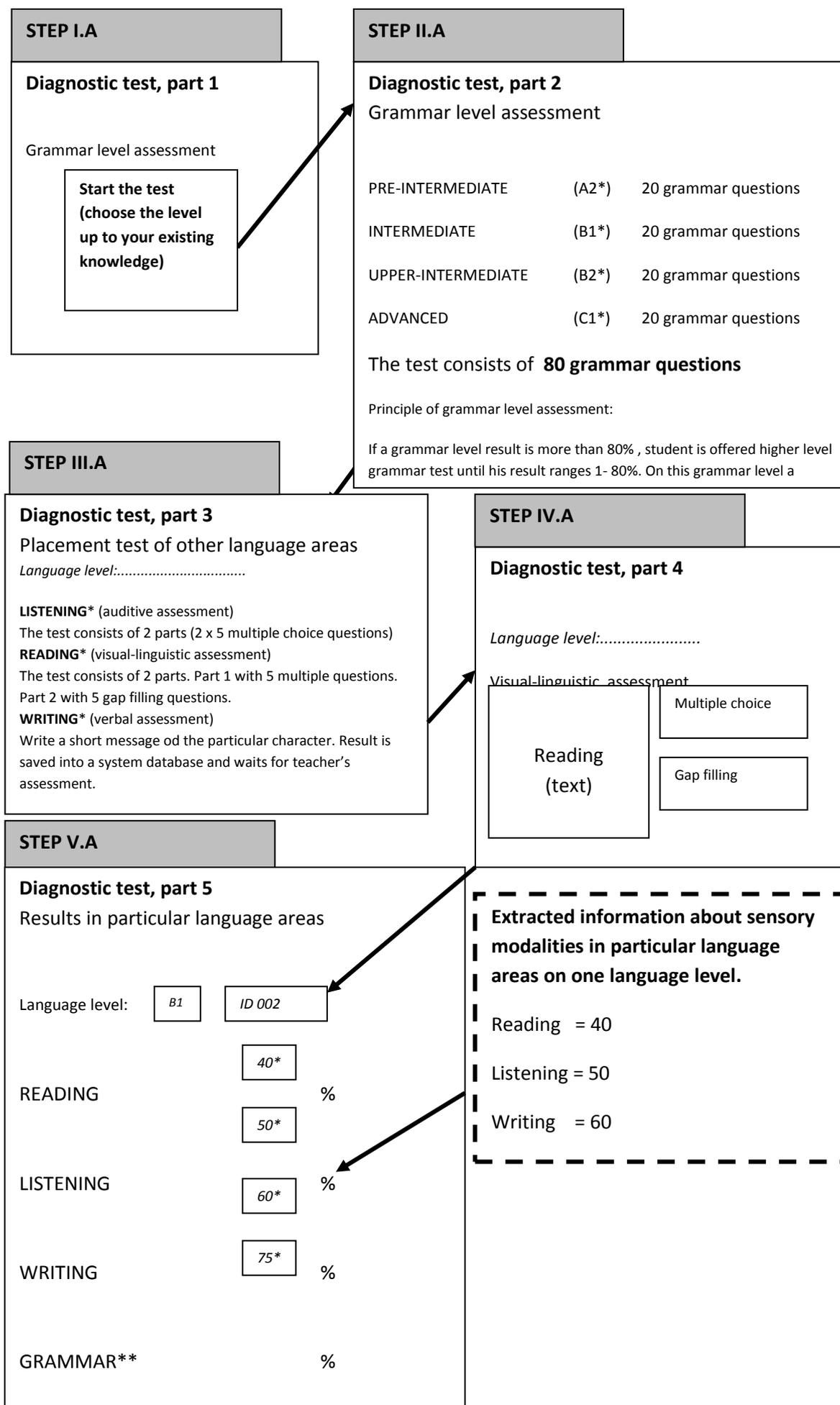


Figure 2: Design of a diagnostic placement test

Listening task instruction:

Listen to the dialogue about a street survey and choose only one correct answer A, B, C.

1. Mrs Rogers lives at _____.

A number 23

B number 23A

C number 23B

D none of the presented answers

Figure 3: Design of a listening task in the diagnostic placement test

Figure 3 depicts an example of a listening task instruction in the diagnostic placement test. Presented listening task is of a multiple choice character. Getting the student to think more about the correct answer and to prevent thoughtless guessing an option D (none of the presented answers) is added to A, B, C options.

Reading task instruction:

Read the article about opinion on appearance. Choose only one correct answer A, B or C.

Young at heart and in body!

Today people are living a lot longer than they used to and their lives are much healthier, too. Older people used to say that they were 'young at heart' when they looked old but felt young. Now, people want to look as young as they feel and they are prepared to spend a lot of money on surgery.

1. People today can change the way they look.

A True

B False

C Doesn't say

Figure 4: Design of a reading task in the diagnostic placement test

Figure 4 introduces a design of a reading task in the diagnostic placement test. The task consists of a text which is divided into parts together forming consistent story. After each part there is a question testing reader's text comprehension. A student can choose from three possible answers to go with each question.

Writing task instruction:

Message

You must have cancelled your evening catch-up English lesson with an English speaking friend who is your flatmate and a schoolmate too. You leave him a message.

Write a message (60-70 words):

- You say **hello and apologize** for a change of your plan
- You **explain** that it was the only solution of the situation
- You **explain** why haven't you contacted him before

Note:
Students will write a message in MS Word and insert it as a task in the system.
Acceptable formats: DOC, PDF, JPG.

Figure 5: Design of a writing task in the diagnostic placement test

In Figure 5 a writing task instruction to test student's verbal language knowledge is presented.

Students are instructed to write a message in MS Word text processor and send it to a teacher for review. Acceptable formats are: DOC, PDF and JPG.

Diagnostic placement testing tasks reliability and scoring

See section 'Conclusion'

Diagnostic placement testing tasks content validity

See section 'Conclusion'

Discussion

Different approach of initial testing for general subjects and for a language learning

When comparing an initial testing approach for general subjects and for a language learning in adaptive eLearning some significant differences can be recognized.

The authors of adaptive eLearning for general subjects Kostolányová, Šarmanová and Takács (2009) divided the approach of getting information about a student in three categories. They are constant, variable and continuous monitoring categories of study activities.

The authors classify a sensory perception, a social aspect of study, study motivation, a systematic nature, way of ordering information, study techniques, study approach and a self-regulation to be part of a constant category. Testing these chosen constant characteristics, a psychological questionnaire was created by Novotný (2010) a psychologist from Ostrava University. There are 31 questions in the questionnaire with the answer key serving as a tool to get information about constant characteristics of each student. A part of this psychological questionnaire (specifically the sensory perception part) was used in the research to design a diagnostic placement test in a language learning. As we can see the authors chose many elements to be part of a constant category. Making the results from a psychological questionnaire more transparent a virtual student has been defined to gather similar student's characteristics. There has been a process designed on how to define a virtual student by data analysis from suitable questionnaires. Giving a questionnaire to a lot of students and with the help of clustering methods the groups with similar students would be created. Such a research has been carried out by Takács from Ostrava University but detection of significant groupings haven't been successful yet. For the time being (2012) a virtual student definition was put in charge of an expert teacher to set the parameters manually.

The variable characteristics are considered to be existing knowledge of a student in a particular subject. Their knowledge is tested in a form of a preliminary knowledge test consisting of questions which are corresponding with knowledge on certain level of a subject.

Continuous monitoring of study activities can serve not only for an ad hoc lesson but also for adjustment of initial student's characteristics or for monitoring of his study progress.

On the contrary to initial testing approach for general subjects, a diagnostic placement test in a language learning gathers information about a student from a constant as well as from a variable category at one go. It means the DPT compiles information about sensory modalities plus a language knowledge in all language areas (except of speaking). The continuous monitoring of study activities isn't included in a language learning test.

The diagnostic placement test is a tool to detect sensory modalities and a language knowledge of a student in three language areas. The evidence of interconnection between dominant sensory modality and better study results of a student in these three language areas (reading, listening, writing) is a subject of further research following after implementation, testing a functionality of a placement test and gathering data about students. After this phase, when detecting dominant sensory modality of a student, the student will be exposed to study material from all language areas but dominant sensory modality attributes will dominate in all these study materials.

For example: if a dominant sensory modality of a student is a visual modality, the student will prepare for a listening task in the form of learning new vocabularies or short sentence structures that appears in a listening task with the help of a visual support. However, the listening task itself will stay the same for all students not taking their dominant sensory modality into account. This has been done for the reason of reflecting reality where nobody exposes the foreigners who learn a language to the language content based on their dominant sensory modality. The main idea of the approach mentioned is preparing students for language tasks reflecting the use of a language in common life.

This approach should also prove if methods to design a diagnostic placement test has been chosen appropriately or inappropriately (in more details, if sensory modalities are somehow interconnected with language areas).

The diagnostic placement test might not meet the expectations of all students as for regarding the detection of their sensory modalities. The test will undergo a functionality testing which should reveal any failings in the presented test design. There should also be a cutting score defined to get through the test successfully. If majority of students manage to get through the test successfully, it will be assessed as an applicable diagnostic test for detecting sensory modalities and student's knowledge in adaptive language learning instruction.

Conclusion

The main idea of the diagnostic placement test in a language learning is to detect existing student's grammar knowledge with the help of a grammar placement test and then at this existing grammar level detect student's existing knowledge at reading, listening and writing language area.

Moreover, on the base of detected results at each language area at certain language level, the student will start his study at the beginning, in the middle of a language level or at the beginning of the following language level at certain language area. This method has been chosen to reflect the fact that a high level of language knowledge in one area doesn't automatically produce high level in other language skills. The student doesn't have to start his language instruction at the same point in all language areas. He can start to study at the beginning or in the middle within one language level or at the beginning of the next language level. Unfortunately, the diagnostic placement test doesn't allow the student to be placed to different language levels if his reading, listening and writing skills are rapidly different. If the test allowed such a knowledge placement, the results wouldn't be possible to use to detect sensory modalities. To detect sensory modalities the results must be acquired at one language level. The results of initial knowledge of a student in particular language areas will not be much misrepresented when tested on one language level as grammar knowledge reflects initial knowledge in other language areas to some degree. In other words, when learning a foreign language, grammar structures at given language level are reflected in reading, listening and writing study materials. For this reason when tested student's grammar knowledge together with other language knowledge at one language level there is a small probability for the student to get 0 points in the placement test. If so, there can be an algorithm added to the DPT where the student can be redirected to a preceding language level in a certain language area.

The outcome of the diagnostic placement test will be stated in percent in grammar, reading, listening and writing language areas at one language level. According to the total amount of

percent in each language area the student will stay at established language level or will be placed to one language level higher or lower. The language levels are defined according to CEFR standard.

As a 'side effect' of this knowledge diagnostics will be detecting student's sensory modalities. The most significant sensory modality or better said attributes of this sensory modality of a student will be included in study materials throughout all language areas. The student then will be exposed to these study materials and it is expected there will be better study result for the students. Better study result in this case is meant to be acquired knowledge tested immediately after study unit and next acquired knowledge tested in time distance. To summarize what has been said above acquired knowledge immediately after a study unit and in time distance. In conclusion, acquired knowledge immediately after a study unit and in time distance is tested to prove better study result in a language learning.

Aspects of testing tasks reliability

Concerning of the diagnostic placement testing tasks reliability all testing tasks of DPT must be adjusted either adding one more option for each testing task excluding all the other answer options or applying the correction on guessing formula by Frary (1988). Both of these approaches should support the reliability of testing tasks of DPT and simultaneously make student's answers more accurate. Lastly, the reliability of all testing tasks should be tested twice to make sure the test returns the same or very similar results of each student.

Aspect of testing tasks content validity

If a content validity of tested tasks fails a different source of testing tasks must be chosen and not Oxford University Press (OUP) testing materials. However, regarding the fact Oxford University Press Publishing is a worldwide recognized institution, we can expect middle content validity of testing tasks and higher.

Aspect of a target group

There is also another aspect necessary to be taken into account and it is a target group of adaptive eLearning system. The diagnostic placement test should not only detect the reality of existing language knowledge in language areas (listening, reading and writing) but also to become an initial phase for individualised language learning.

Language teachers are aware of existence of different students' language skills in particular language areas, however, in a language classroom it is not possible to offer students a form of individualised learning. Instead, they apply only individual approach which can be considered insufficient in the light of students' differences when learning a foreign language.

The adaptive eLearning system could serve students at secondary schools to take catch-up lessons or to students at tertiary education system to be enrolled at lifelong learning programmes.

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