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Materials Design for Language m-Learning

ABSTRACT

Today's smart phones are versatile multimedia devices. Their processing power is incredible compared to decades-old personal computers (PCs), and the time is right to use them in education. The touch screen has provided a haptic user interface that cannot be considered as merely another mouse. The design of m-learning materials therefore needs to follow a special set of rules to maximize the efficiency of constraints posed by the devices and the user interface. In the article the design considerations are presented in the context of a practical application for using mobile devices in language learning with the application BlaBla™.

Key words: m-learning, design, mobile-assisted language learning (MALL), haptic user interface

Načrtovanje gradiv za mobilno učenje jezikov

POVZETEK

Današnji pametni telefoni so postali vsestranske multimedijske naprave. Njihova računska moč je veliko večja od računske moči računalnikov izpred desetletja in tako je sedaj nastopil ustrezni trenutek za uporabo mobilnih naprav v izobraževanju. Tipni uporabniški vmesnik, uporabljen na občutljivih zaslonih, ni le druga oblika računalniške miške. Načrtovanje mobilnih učnih gradiv mora slediti posebnim pravilom za izboljšanje učinkovitosti omejitev prenosnih naprav (tudi pametnih telefonov) na področju aparaturne opreme in uporabniškega vmesnika. V članku predstavljamo vse dileme načrtovanja mobilnih učnih gradiv na praktičnem primeru aplikacije BlaBla™, ki je namenjena za uporabo mobilnih naprav pri učenju jezika.

Ključne besede: mobilno učenje, načrtovanje, mobilno podprto učenje jezika, tipni uporabniški vmesnik

Introduction

M-learning is a learning process that spans social and contextual interactions with the aid of personal electronic devices. The primary motive behind m-learning is not the learning or mobile technology itself but their mutual combination (Crompton 2013a, 4 and 10) in such a way that learning materials can be used with much less space and fewer time constraints. In our case, m-learning comes from e-learning that combines ICT and web for teaching and learning, but it is conceptually different because of the constraints of mobile devices (Figure 1). Learning materials for computer use are not suitable for portable devices for the following reasons: (a) mobile devices have visual constraints, (b) they employ a haptic user interface, and (c) education is supported by the haptic user interface. (Moore et al. 2011, 130) (Ozuorcun 2012, 301) (Krašna 2015).
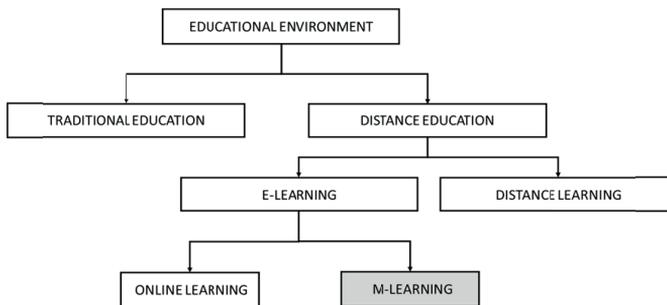

Figure 1: Mobile learning environment (Ozuorcun 2012: 302)

Until 2009, m-learning was considered just as a mobile e-learning or distance e-learning (Traxler 2009, 1). Today, however, the differences are so huge that they share only a common background (Table 1) (Crompton 2013b, 48).

Table 1: Differences between traditional learning, e-learning and m-learning (Liu and Hwang 2010) (Moore et al. 2011, 130) (Crompton 2013b, 50)

	Traditional learning	E-learning	M-learning
Time	Limited with formal learning units (synchronous learning).	Limited to the time spent in front of the computer but can be at any time of day.	No limits. Learning can start anytime, anywhere mobile devices can be used (asynchronous learning).
User adaptability	Limited in all aspects of differentiation and learning concepts.	Partial adaptability depends on number of users of single computer.	Enables total user adaptability.
Privacy	No.	In general, considered as private.	Yes.
Space	Limited to the learning environment.	Many static locations are possible.	Multiple possible environments. Limited only by connectivity, if required.
Formality type	Formal.	Formal and informal.	In general, informal but can be formal under certain conditions.

	Traditional learning	**E-learning**	**M-learning**
Social interaction	Connections established in the real learning environment.	Virtual connectivity using WWW.	Both types of connectivity are possible (virtual and real).
Spontaneity	Non-spontaneous, mostly passive learning.	Partially spontaneous.	Depends on opportunity, can be very active.

Because every generation of mobile devices becomes more powerful and their educational suitability expands, definitions of m-learning are changing. The most contemporary m-learning definition is as follows:

> Mobile learning involves the use of mobile technology, either alone or in combination with other information and communication technology (ICT), to enable learning anytime and anywhere. Learning can unfold in a variety of ways: people can use mobile devices to access educational resources, connect with others, or create content, both inside and outside classrooms. Mobile learning also encompasses efforts to support broad educational goals such as the effective administration of school systems and improved communication between schools and families. (UNESCO 2013)

In the last decade many digital and web innovations were introduced to and embraced by the field of education (Pegrum 2014). Many educational institutions lag behind the advancement of the new technologies for numerous, complex reasons: insufficient budget, established technological infrastructure, organizational rigidity, and unsupportive leadership (Abbott et al. 2013). With the new abilities of mobile ICT for learning, many new studies have been conducted in the area of m-learning and ultra-portable devices with a haptic user interface (Wang et al. 2014, 243). One such study was conducted at the Faculty of Arts, University of Maribor, using the mobile application BlaBla™ (mobile learning of Slovene language) (Pukšič 2015).

There are still convergent naming patterns for learning with ICT: CBL (Computer Based Learning), CAI (Computer Assisted Instruction), TBT (Technology Based Training) and some less frequent terms (Pardede 2012, 167). The application of m-learning to traditional learning forms blended learning (also known as hybrid learning, the blended learning model or B-learn). At the start of the 21st century when the theory of e-learning emerged, blended learning was considered as operating on e-learning principles.

Blended learning is a concept of teaching and learning where traditional (frontal) education embraces different learning principles and educational technology (Knewton 2014). The definition of blended learning has not yet received academic consensus; therefore, four concepts of blended learning can be found (Driscoll 2003, 1):

Combination of different web technologies to achieve educational goals (i.e., virtual classrooms, self-learning, cooperative learning, streaming video, audio and text).

Combination of pedagogical approaches to achieve optimal learning results with educational technology or without it (i.e., constructivism, behaviorism, cognitivism).

Combination of any type of educational technology with frontal lecturing (i.e., audio-video technology and web).

Combination of educational technology with actual work assignments to achieve harmony in learning and work.

However, many authors advocate only definitions that emerged after 2006 where blended learning is defined as combined learning in a formal educational program where learners use learning materials partly on the web, where time, place and pace are self-regulated and partly at the educational institution (away from home) (Clayton-Staker and Horn 2012, 3). With this definition in mind, we come to m-learning, where „whenever and wherever" form the substrate for all modern definitions (UNESCO 2013).

Considerations about mobile devices and mobile applications

We have conducted a research experiment involving Slovene language as foreign language learning. For the purpose of this experiment in blended learning, we designed and developed a mobile application for Slovene language learning for Android devices. The background for the language learning was the ERASMUS intensive language course (EILC) at the Faculty of Arts – Slovene for non-Slovenes where foreign exchange students first met with the Slovene language. The M-learning application was developed as a prototype for a few multimedia supported topics (text, graphics and sound). We assumed that foreign students would know English; therefore, all explanations were in English. The application called BlaBla™ follows the principle of personalization and individualization of language learning processes (Pukšič, 2015). There are two distinct settings for female and male learners, and according to these settings, the application individualizes the topics for vocabulary acquisition. The application was developed under our design specifications by professionals from the Melionet and Gimag companies. The human-computer interface is the paramount consideration when designing mobile user interfaces, which require knowledge of the learning topics, learning topic design and also an understanding of user psychology (Figure 2).
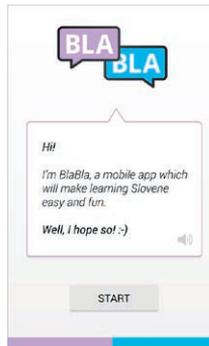
Figure 2: Start page of mobile application

In the design and development, we need to consider the minimal and recommended system requirements. Ignoring the minimal system requirements for the application will mean frustration for the users, and it is wise to prevent installation if minimal system requirements are not met (Grady 2006, 4).

It is necessary to understand the differences in the design of desktop and mobile applications. Some still consider these to be equal, but a mobile application is not a scaled down or downgraded version of a desktop application (Bedell 2014); instead, it is an autonomous entity that functions in different mobile environment in „conditions of use, multitasking, motion and connection" (Rao 2013). Mobile applications are under constant, rapid evolution, and at any given time on the market, there is a multitude of devices with significantly different hardware (processors, memory, screen sizes and operation systems). In such an environment we need to specify the system that is good enough for our application to run (Hatter 2014) (Panda 2014).

Table 2: System requirements for the BlaBla™ application.

BlaBla™ v. 1.3.3	Minimal system requirements	Recommended system requirements
Operation system	Android v. 2.3.3	Android v. 4.1
Processor	800 MHz	4-core, 2,4 GHz
Memory	278 MB RAM	2 GB RAM
System storage	15 MB	15 MB
Screen resolution	320 × 480 pixel	1080 × 1920 pixel
Internet connection	install and update	install and update

Taking the decision for such system requirements was not easy, but according to our survey of foreign students, most of them (79 %) do have mobile phones that meet the minimal system requirements.

A mobile application can be a native, web, or hybrid application:

- Native applications would perform best and would not require any additional internet connections after installation.
- A full web application could be simple and light and would require constant internet access. This approach was not suitable in our case, since we cannot assume the same functionality on different phones.
- A hybrid application in our case means that the application uses a native container and display web content (access to the web content is either online or stored in the phone memory). Such a development allows simple conversion from an application developed for one phone to another, since content remains the same; only the native application needs to be changed, depending on the phone.

We decided to develop BlaBla™ as a hybrid application.

User interface

The user interface is one of the most important parts of the computer program and determines the quality of user communication with the program logic (Stopper and Seiber 2012, 3). Today most computer programs have GUI (Graphics User Interface) for user-computer communication. Therefore, navigational elements (toolbars, windows, buttons and icons) are selected with the keyboard, mouse, touchpad or haptic screens (ANSYS 2009). This type (GUI) for controlling the program's behavior has become standard in all operation systems. A good user interface assures user friendliness and enables interaction with software and hardware in a natural and intuitive way (TechTerms 2014).

Design Guidelines

General guidelines for the design of handheld device user interfaces (Gong and Tarasewich 2004, 3751-3754) were evolved from the basic rules for ensuring effective interaction between human and PC (Personal Computer) „*Shneiderman's Golden Rules of Interface Design*" (Shneiderman 1998, 74-75). Traditional guidelines for PC were transformed to suit the mobile context:

Frequent users need shortcuts to reduce the amount of interaction with the software and increase the speed of input.

User understandable feedback is needed for any software function (from key press to the system message).

Users must have complete control over the software and the device.

Encourage compatibility – equal functionality on different computers or devices (Brodnik et al. 1991, 205).

Assure UNDO (restore actions to the previous state).

Preventing errors is equal on PC or mobile devices, but mobile devices require faster response time because of the unpredictable dynamics of events.

Prevent overload of user's short-term memory. The user interface for mobile devices needs a design that does not require extensive user mental activity, owing to the many distractions common in the mobile environment (different sounds for different selections or unpredictable physical contacts) (Chan et al. 2002, 192) (Kristoffersen and Ljunberg 1999) (Tarasewich 2003).

Nevertheless, the last decade has brought changes even to these design recommendations. The haptic user interface matured, and the contemporary interaction model is different. Mobile devices are not considered as portable low-functioning PCs. Effort is focused on the users' behavior and on the search for optimal connectivity with the internet and the capabilities of the haptic user interface (Dastidar 2014). Therefore, haptic mobile user design recommendations have changed: (Hashim 2010, 227)

1. Simple, clear, and consistent navigation (#consistency).
2. User friendly application to enable users to master an application in minutes (#ergonomics).
3. Learning materials must not require frequent screen scrolling (#scalability).
4. Flexibility of the screen is an extremely important feature for the usability of the interface (#flexibility).
5. Only information relevant for the learning process needs to be displayed; all other irrelevant information is considered didactic noise (#relevance).
6. The amount of text needs to be minimized; use images or animations instead to decrease cognitive load and maintain motivation (#less_is_more).
7. Educational processes are exclusively controlled by users (#control).

Touch screen – haptic input device

In the process of designing m-learning user interfaces, two facts need to be taken into consideration: (a) users have an unmanageable set of varied dimensions (screen sizes) on ultra-portable devices which all require (#flexibility) automated positioning of navigation elements and learning content on the screen; and (b) differences between PCs and mobile devices, where the haptic interface on mobile devices enables direct sensor-motoric coordination of content (Beaudouin-Lafon 2004, 19), but the computer mouse is an indirect device (Jacob 1996), and an indirect computer interface always presents a significant cognitive challenge in mental transformation (Collins McLaughlin et al. 2009, 2).

Direct interaction with body movement (finger touch) does not need mental transformation and is much more suitable for learning because of its low cognitive load (Charness et al. 2004). Effective interaction is governed by #ergonomics and a phone's touch screen is often used with one hand only. In such cases it is fundamental to place key elements on the ellipsoid path of the thumb. For

those who use a phone with two hands, the size of the screen elements is more important. There is a negative correlation between the size of screen elements and the probability of a wrong entry or of calling incorrect program functions. This is also why elementary functions should be moved away from the basic movement of the thumb or be sized small enough to retain their navigational functionality, while at the same time minimizing the risk of accidental entry (Anthony T. 2012). Zones of thumb movement and position of the elements are shown on the image (Figure 3) where (Henley 2012) (Clark 2014),

1. is the primary zone used for repeated actions involving learning content (selection, movement, play), and
2. is the secondary zone reserved for single system commands (exit, undo, confirm, delete etc).

Figure 3: Thumb zones on the phone screen (right-handed user)

Readers should be aware that the mouse is not the same on the touch screen. Mouse actions always have the same meaning, but touching the screen can be different from application to application (EI Lab 2015). Names for the most common actions of screen touching and their actions are presented in the table (Table 3).

Table 3: Haptic inputs and their action

Type of touch	Action
Tap	Tap on a specified area or navigation element opens, activates or selects an area or element. Used also for play/stop of media files or to stop the movement of the content.
Double tap	Double tap is used for selection and to start the action related to that element or to increase or decrease the images on the screen.
Drag and drop	This is often used for movement of the elements on the screen but can be used for sliding between screens.
Flick – horizontal between screen movement	Flick is a primary gesture for page switching for content that is displayed on more than one screen.
Slide to scroll	Many mobile devices have small screens and are unable to display content in one screen alone; therefore; scrolling is the method for reviewing content. Scrolling can be vertical or horizontal and is based on momentum.
Button to scroll	In case of large amounts of content, a button enables rapid scrolling (i.e., at the bottom of the page we have a button to take us back to the top).

Navigation

In the case of navigation, good design should always obey the system-wide navigational pattern. There are differences between Android, iOS and Windows mobile navigational patterns, and for reasons of #consistency, we need to design navigation accordingly. In our case we decided to place navigational elements on screen according to the Android philosophy of navigation (Figure 4).
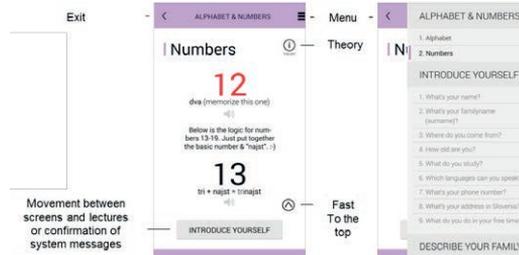
Figure 4: Position of navigational elements.

The application's design background

In our BlaBla™ application, we chose to use a minimalistic approach #less_is_more. A previous study (Kristoffersen and Ljunberg 1999, 280) showed that too many visual stimuli on mobile devices distracts the user from the content. Therefore, we chose not to use rich gradient elements but to use simple single-color or text components subordinate to the content (Vukovic 2014). We also used pictograms whenever feasible. These were particularly useful in the lecture „Know your garment," where a picture of a single garment item prove to be much less mentally taxing than highly ambiguous text for those whose primary language was not English (all the students involved in the experiment had differing levels of knowledge of English). Such an approach was therefore more suitable from the perspective of cognitive load theory (CLT) and optimizes intellectual capacity for the perceptive activities important for learning; the use of different information sources can induce cognitive overload and complicate the learning process (Chandler and Sweller 1991, 293) (Sweller et al. 1998, 251). In this way we also ensure the „spatial and temporal contiguity principle," whereby it has been proven that learners retain more knowledge/facts if corresponding words and images are displayed in the immediate spatial vicinity (Mayer 2009, 267).

Multimedia in language learning

Besides curriculum and learning activities, learning materials are key elements in the design of any language learning method which defines language learning as speaking, understanding spoken language, understanding text and being able to write in the foreign language (Richards and Rodgers 2003, 24-30). Studies

of m-learning in multimedia language learning span a range of activities: from strategic analysis of multimedia learning materials, to the cognitive psychology of multimedia theories (Plass and Jones 2005, 469). Our research was therefore based on an interactive perspective on foreign language learning, where learning has three key functions: understandable input, interactivity and understandable language production (Krashen 1982) (Long H. M. 1985) (Swain and Lapkin 1995) (Plass and Jones 2005) (Figure 5). The m-learning user interface is designed with words, sound recordings and images and presented in the continuum of „input" – „intake" – „output" (Pirih Svetina 2005, 145) to accomplish #relevance and encourage receptive understanding and language reproduction.
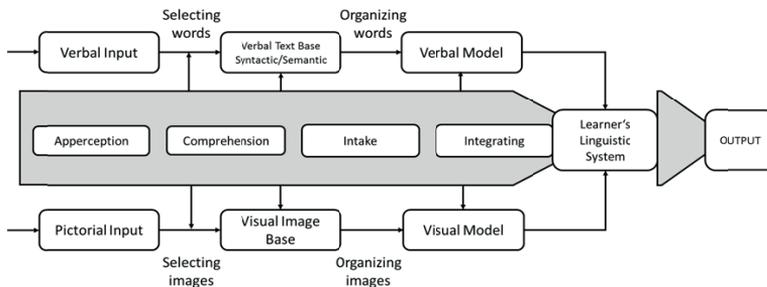

Figure 5: Integral model of application of multimedia in foreign language learning.

Customization and differentiation of user interface

Almost all languages differentiate between male and female language. To encourage intrinsic user motivation, we follow the didactic differentiation in social gender relevant to the accompanying substrate (Toporišič 2000, 13). This implies effective development of morphological, morphosyntactic and phonological abilities of learners in two distinct versions – male and female. We used the common color coding for male (blue) and female (purple) in the user interface (Figure 6) and appropriate use of either male or female voice to satisfy the gender-based approach to pronunciation accuracy (Jahandar et al. 2012). Female and male speakers are distinctive in many attributes: pitch, shorter vocal tract of female voice (Adda-Decker and Lamel 2005, 2207), reduced vowels among males in faster speech, etc. We should never use a male voice to impersonate the female or vice versa, since this would sound unnatural (Trubetzkoy 1969, 18).
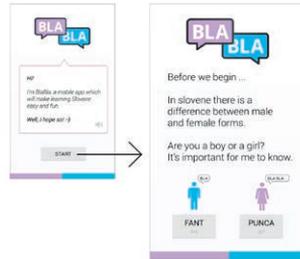
Figure 6: Gender differentiation of the application setting

Experiment

The mobile BlaBla™ app was developed specifically for the needs of the pedagogical experiment in which we determined the preferences of the mobile user and the potential of such a supporting m-learning module as part of an organized intensive language course in EILC. Prior to the development of the mobile applications, we employed a pilot study to monitor the dynamic aspect of learning Slovene as a foreign language, and researched current theoretical foundations of mobile learning; the results are included in the concept of the unique user interface, with which we wanted to confirm m-learning empirically as a promising form of foreign language education.

A free course in Slovene as a foreign language, EILS, is offered to all foreign students who study in Slovenia. It is funded by the EU from the Erasmus student exchange funds. In 2013 and 2014, two courses were held at the Faculty of Arts at the University of Maribor. In 2013 we gained valuable insight into the foreign students' activities, learning behavior, common faults and mistakes, most common problems with language learning, and their motivation. This first course was used for software specification, and the second was used to verify the efficiency and didactic value of the m-learning application to foreign language learning.

Between January 31, 2014, and February 14, 2014, 24 foreign students attended the EILC. We separated them into two groups, where the first group (experimental) consisted of (12) students whose mobile phones matched the minimum system requirements for the BlaBla™ application. The second group of (12) students were in the control group. We later discovered that three (3) students from the control group did not attend the EILC course, which changed the perfect balance of the group.

The students came from Slavic language speaking countries and non-Slavic speaking countries (5 – Czech, 1 – Slovak, 5 – Finnish, 4 – Spanish, 1 – Hungarian, 1 – Lithuanian, 1 – Turkish, 1 – Norwegian, 1 – Portuguese, and 1 – Estonian). EILC do not assume differences between students from different language backgrounds, though we do know that Slavic speaking students have fewer problems with the pronunciation of Slovenian words. The course is intended as an introduction to the Slovene language at the level of A1 an A2 on the EU language scale. Our

m-learning application did not cover the whole EILC course but only some topics, to prove the concept. In the formal test at the end of the EILC course, two questions were covered by our m-learning application. All experiment participants also answered a questionnaire, where we gathered detailed student feedback about our application.

Topics covered by our m-learning application

As previously described, only some topics from the language course were developed for proving the concept. These topics were as follows: alphabet and numbers (Figure 7, Figure 8); introduce yourself (Figure 9, Figure 10, Figure 11); describe your family (Figure 12, Figure 13); and what you are wearing (Figure 14, Table 4). These topics are presented in figures or tables.

Alphabet and numbers
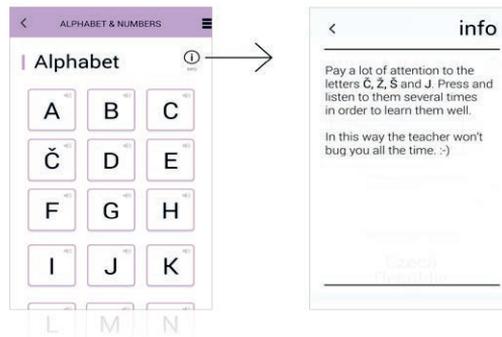
Figure 7: Learning the alphabet

Figure 8: Learning the numbers

Introduce yourself

Figure 9: Introduce yourself – name
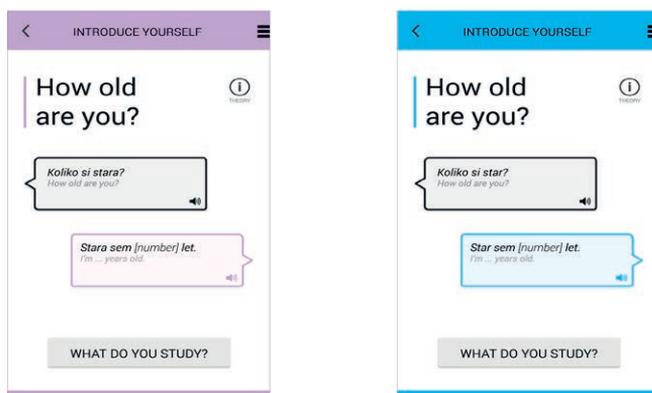
Figure 10: Introduce yourself – age
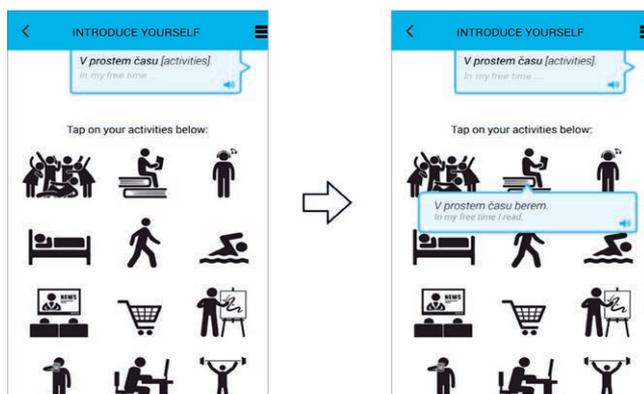
Figure 11: Introduce yourself – free time

Describe your family
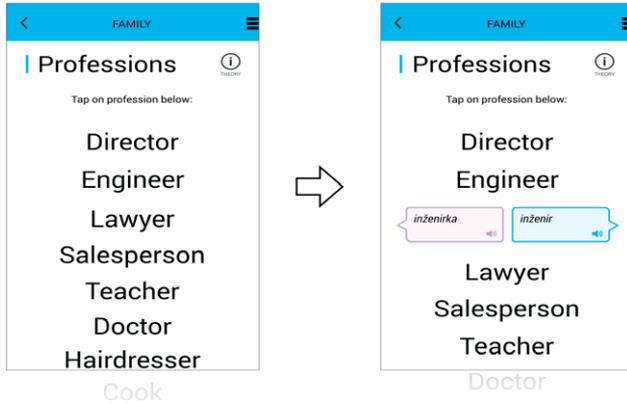
Figure 12: Describe your family – mother's/father's profession
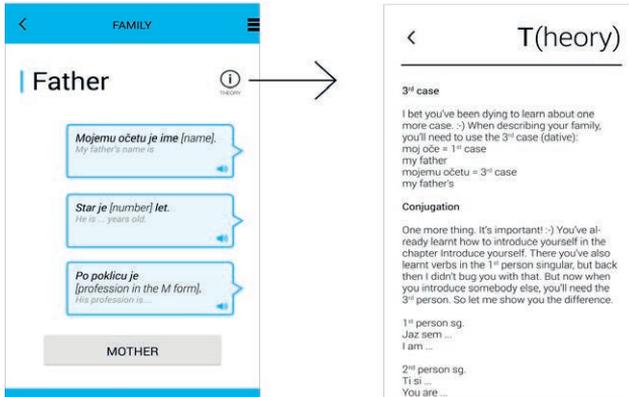
Figure 13: Describe your family – describe your father

What are you wearing?

Figure 14: Learning colors

Table 4: Learning the garment

What are you wearing?	
Question	**Answer**
Kaj imaš na sebi? *What are you wearing?*	*Na sebi imam [clothing in the 4th case].* *I'm wearing …*
Image	**Statement**
	Na sebi imam [color] čevlje. *čevlji (shoes, M. pl)*
	Na sebi imam [color] škornje. *škornji (boots, M. pl)*
	Na sebi imam [color] športne copate. *športni copati (sneakers, M. pl)*
	Na sebi imam [color] hlače. *hlače (trousers, F. pl)*
	Na sebi imam [color] kavbojke. *kavbojke (jeans, F. pl)*
	Na sebi imam [color] krilo. *krilo (a skirt, N)*
	Na sebi imam [color] majico. *majica (a T-shirt, F)*
	Na sebi imam [color] bluzo. *bluza (a blouse, F)*
	Na sebi imam [color] pulover. *pulover (a sweater, M)*
	Na sebi imam [color] jakno. *jakna (a jacket, F)*
	Na sebi imam [color] bundo. *bunda (a winter jacket, F)*
	Na sebi imam [color] plašč. *plašč (a coat, M)*
T(heory)	

Clothes and colors (nouns and adjectives) match in case, gender and number. For example, črni čevlji (black shoes, M), modre kavbojke (blue jeans, F), rjava jakna (brown jacket, F).

Na sebi imam … (I'm wearing …) needs the 4th case. For clothes in the masculine or neuter genders, the ending stays the same: rjav pulover – na sebi imam rjav pulover (a brown sweater – I'm wearing a brown sweater); belo krilo – na sebi imam belo krilo (a white skirt – I'm wearing a white skirt). Be careful with rdeče krilo (a red skirt). In this case, the endings don't match because the "o" changes into an "e" after the sounds c, j, č, ž, š and dž.

For clothes in the feminine gender, the ending in the 4th case is "o": črna jakna – na sebi imam črno jakno (a black jacket – I'm wearing a black jacket).

Not all clothes are in the singular. Hlače & kavbojke (trousers & jeans) are of feminine gender and are used only in the plural: na sebi imam hlače/kavbojke (I'm wearing trousers/jeans).

Another example is čevlji (shoes, pl.) In Slovene, shoes, boots & sneakers can be singular or plural (čevelj, čevlja, čevlji), but only the plural is used: na sebi imam čevlje/škornje/športne copate (I'm wearing shoes/boots/sneakers).

TIP

When you learn different items of clothing, join them into a sentence with the conjunction "in" (and) before the last part. This will make you sound more natural: Na sebi imam črne čevlje, rdeče krilo, belo bluzo in siv plašč. (I'm wearing black shoes, red skirt, a white blouse and a grey coat.)

Findings

As mentioned before, we collected data from students of the experimental group (5 females and 7 males) with a questionnaire comprising 26 questions. In most cases questions were closed type. The questions asked are presented in the table (Table 5).

Table 5: Questionnaire for the students attending EILC.

age	number
gender	male / female
country of origin	text
mobile phone	text
number of application installed on mobile phone	number
proficiency in English	A1/A2/B1/B2/C1/C2
proficiency in ICT	(1) poor, (2) sufficient, (3) above average, (4) excellent
proficiency in mobile technology	(1) poor, (2) sufficient, (3) above average, (4) excellent
learning preferences	text, image, sound, video, interactivity
learning type	(1) traditional – textbook only, (2) mostly textbooks but also web, (3) mostly web, occasionally textbooks, (4) web exclusively
mobile devices as learning aid	(1) exclusively for communication, (2) mostly for communication occasionally other things, (3) small computer fine for education, (4) extension of my body and mind
content: usefulness of learning items	(1) useless, (2) okay, but need more topics, (3) useful, (4) very useful
content: most useful topic	(1) alphabet and number, (2) present yourself, (3) describe your family, (4) what are you wearing?
content: reason for choosing learning items	(1) I like the way it works (2) good introduction to the Slovene language (3) I don't know, I just like it.
content: effectiveness of communication	(1) useless, (2) okay, but would need other types, (3) useful, (4) very useful

content: presentation preference	(1) touch the word, (2) touch the icon, (3) touch the image, (4) all are equal
content: theory	(1) useless, (2) okay, but too complicated, (3) useful, (4) very useful
content: sound recording of native speaker	(1) useless, (2) okay, but I don't need it, (3) useful, (4) very useful
content: learning quiz	(1) useless, (2) okay, but too easy, (3) useful, (4) very useful
content: use of opposite gender in application	yes/no
content: what should be extended	(1) more topics, (2) more sound, (3) more theory, (4) more quizzes
operation: ease of navigation	(1) I'm lost, (2) I need a lot of time for navigation, (3) navigation is natural
operation: sound quality	(1) too quiet to understand, (2) quiet but understandable, (3) okay, (4) excellent
operation: speed	(1) too slow, (2) slow but works, (3) okay, (4) excellent
operation: size of learning chunks	(1) too small, (2) can be read but strains the eyes, (3) optimal for the size
operation: observed faults	(1) no, (2) yes, (3) just some inconveniences

All students from the experimental group found the application useful. On a scale from 1 to 4 (this scale was used on purpose because we did not want neutral answers), the mean value was 2.92, with no significant difference between male and female students . A tendency can be observed for students who are more ICT skilled to rate the application higher than others did

The most useful topic in the m-learning application was Introduce yourself. There is a tendency towards some differences between male and female students in this topic .

The background theory that is displayed on demand was generally well accepted and, since the explanation is in English, we could not detect any influence on the use of theory based on the knowledge of English.

We assumed that sound support would be more important to the students from non-Slavic speaking language backgrounds, but we could not prove this. Later, we discovered that three Finnish students were very familiar with a Slavic language, since most Finns learn Russian in primary school and are quite fluent in it (Zaikina 2011). When we exclude Finns from the non-Slavic group, we see that, for the real non-Slavic speaking students, the opportunity to hear Slovene pronunciation was very useful – all 6 of them graded it as „very useful" (highest possible score).

The effectiveness of the m-learning application was assessed by using the students end test performance. We wanted to know if using the application influenced the grade earned by student on the test. As previously mentioned, only two questions on the test were supported by our application, and scores from these two questions show that there were no statistically significant differences between groups (users vs. non users of the application) for the first question ($t = 10.083$, $P = 0.323$), and a tendency for the second question ($t = 10.199$, $P = 0.054$). Even though the users of the application received much higher scores (7.55 out of 8) on the second question compared to non-users of the application (6 out of 8), the Mann-Whitney

U-test showed no statistically significant differences between groups (U = 29.000, P = 0.131). The results, on the other hand, do show that the EILC course is well structured and didactically suitable for all participants. On the other hand, we discovered that there was a tendency for those with greater ICT knowledge to get better scores on the second question (t = -2.182, P = 0.057).

Conclusion

Language learning for foreign students proved to be a good sample for an m-learning application. Since m-learning must assume an imperfectly mastered reference language (in our case English) in order to learn the target language (Slovene), we need to prepare m-learning materials with the least possible distractions and maximum efficiency. The design process of the m-learning materials proved to be the key component in the success of the language learning and usability of the application. The given design recommendations are suitable for any learning age, since it is widely known that children master haptic user interfaces and mobile devices with ease, while this is not true for the mouse and the PC. We have provided a good starting point for any author and developer who want to create m-learning materials. The concept was proven suitable for any discipline, not only the natural sciences, as many mistakenly believe. We sincerely believe that this is just one of the initial steps into a new landslide of limitless m-learning software development.

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