

Everyday patterns in lifelong learners to build personal learning ecologies

Citation for published version (APA):

Tabuenca, B., Ternier, S., & Specht, M. (2012). *Everyday patterns in lifelong learners to build personal learning ecologies*. 86-93. Paper presented at 11th World Conference on Mobile and Contextual Learning (mLearn 2012), Helsinki, Finland.

Document status and date:

Published: 17/10/2012

Document Version:

Peer reviewed version

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

<https://www.ou.nl/taverne-agreement>

Take down policy

If you believe that this document breaches copyright please contact us at:

pure-support@ou.nl

providing details and we will investigate your claim.

Downloaded from <https://research.ou.nl/> on date: 22 May. 2025

Open Universiteit
www.ou.nl



Everyday patterns in lifelong learners to build personal learning ecologies

Bernardo Tabuenca

Stefaan Ternier

Marcus Specht

Open University of The Netherlands
Valkenburgerweg 177, 6401 DL Heerlen
{bernardo.tabuenca; stefaan.ternier; marcus.specht}@ou.nl

ABSTRACT

This article presents the results from a questionnaire filled out by 147 lifelong learners. The primary aim of the questionnaire is to analyse learning practices of adults, and to recognize patterns of lifelong learners in order to support them with technology. These patterns capture the context in which lifelong learners are more willing to learn, that is, the day of the week, duration, location, activity being performed, type of device being used, way to interact with their devices and how these aspects can affect when an adult student takes the initiative to learn. Moreover, this article examines previous publications on surveys, questionnaires and information collected with the same objective, to corroborate and contrast the findings. The contribution of this paper is identifying and describing patterns in which lifelong learners are more willing to build personal learning ecologies when supported by mobile devices.

Author Keywords

Mobile usage patterns, lifelong learning, personal learning ecologies, survey

INTRODUCTION

Lifelong learners are confronted with a broad range of activities they have to manage every day. In most cases they have to combine learning, working, and everyday life throughout the day. For the support of lifelong learners, their daily practices and learning patterns are of importance. Lifelong learning includes a variety of different educational scenarios and contexts in which learners operate. These contexts include traditional formal programs, non-formal education, on the job-training and informal, accidental learning. Fischer (2000) even values lifelong learning as a mind-set that people have to acquire including the following learning scenarios: self-directed learning, learning on demand, collaborative learning and organizational learning.

One of the most critical challenges for the implementation of lifelong learning is to integrate real world problems and learning in the same process. One promising approach to connect the worlds of working and learning is a pattern approach. According to Alexander (1977) each pattern describes a “problem, which occurs over and over again in our environment, and then describes the core of the solution to that problem”. Rohse & Anderson (2006) propose design patterns that should enable the detailed formalized description of “the dynamics between learning and technologies without the potential ideological or pedagogical mask of teaching in formal education and training settings”. In the setting of an adult lifelong learner this is especially difficult as in most cases interests might be highly distributed over different domains and keeping up learning needs an extra effort. Lowering the barriers for access to relevant information and support services anywhere, anytime, and anyhow is one essential component for efficient lifelong learning support.

The idea of a Personal Learning Environment (PLE) recognises that learning is on-going and seeks to provide tools to support this kind of learning. It also recognises the importance of the individual to organize his or her own learning in order to embed it in contexts of daily life (Attwell, 2007). Personal Learning has been hierarchized into learning activities, episodes and projects (Vavoula & Sharples, 2002) (Tough, 1971). Vavoula & Sharples (2002) define “learning activity” as the distinct acts that the person carries out during reading, discussing, listening and making notes. Tough (1971) defines a “learning episode” as a well-defined period of time that is held together by the similarity in intent, activity or place of the thoughts and actions that occur during it; it has a definite beginning and ending in time. “Learning projects” are formed by grouping episodes together on the basis of their contingency in terms of purposes and outcomes that could happen at different locations.

A QUESTIONNAIRE FOR LIFELONG LEARNERS

This article describes the results from a questionnaire filled out by 147 lifelong learners (Tabuenca, 2012 – ANNEX I to VII). The questionnaire was distributed both in English (ANNEX I) and Spanish (ANNEX II) taking advantage of the following channels: social networks, three Dutch and Spanish universities, two high schools from Belgium and The Netherlands, two companies, one academy for skills-training and the author's blog. The survey was stored in an on-line platform¹ so that everybody could access and fill out the questionnaire making use of the distributed URL. Answers were collected over the course of three months. Participation was voluntary and unrewarded.

The questionnaire is composed by 21 items, these are, 5 multiple choice questions, 6 single select questions, 9 matrix selection questions, and 1 open answer question. An introduction section (60 words) was included in order to explain the aim of the questionnaire and to define frequently used concepts within the items. These concepts are: a) *Mobile device: regular phone, smartphone, tablet, multimedia player and laptop when used not always in the same place*; b) *Learn: taking the initiative to learn something actively. It can be related to work, current studies or self-fulfilment*.

There are 4 questions about demographics (age, genre, occupation, and professional domain), 3 questions about usage patterns with mobile devices, 2 questions about how timing and content are related, 7 questions linking activities, locations, and ways of interaction with lifelong learner's mobile devices, 1 question identifying difficulties when learning with mobile devices, 3 questions about the lifelong learner's motivation, and 1 more question to estimate how familiar is the concept of *lifelong learning* for the participants.

The data with the answers has been exported from the on-line survey platform to a spreadsheet (ANNEX III) file. This file has been imported with a database engine in order to create a table (ANNEX IV) for each of the questions in the survey. A database client has been used to build joining-table queries (ANNEX V), aiming to find patterns in the answers given in different questions. Chart reports (ANNEX VI) have been created from these requests to carry out the analysis (ANNEX VII).

The results of this questionnaire are presented including references to previous studies on mobile device usage patterns and mobile learning support, in order to contrast and corroborate the conclusions.

Results from the questionnaire

The concept of "lifelong learning"

Participants were given the following definition in order for us to assess how familiar were they with the concept of "lifelong learning": "*All learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective*" (European commission 2011). When participants were asked whether they considered lifelong learners themselves, 21.76% reported a negative answer. However, it is paradoxically that these same respondents answered positively to the question "*Do you have a natural motivation to learn?*"

Patterns based on type of device, lifelong learners' behaviour and timing

The presence of mobile devices in lifelong learners' daily activities is a fact and this can be gathered from the results of the questionnaire. Portable computers are used every day by 70.06% of the respondents. Smartphones are used every day by 56.46% of the respondents, while 17.68% use their tablet on a daily basis.

Trends indicate that smartphones and tablets are the cornerstone in future learning designs since they are even more portable than portable computers. The smartphone is easily carried around in a pocket and can be used in any moment of the day. A study performed by Arbitron (2011) concluded that engagement with different smartphone features is divided evenly during the day detecting a slight peak in the afternoon from 15h to 18h.

Our results show that there are two time slots of the day in which lifelong learners feel more motivated to learn, these are from 10h to 12h (55.78%) and from 16h to 20h (49,66%). This discontinuity is happening due to the pause to have lunch, in which generally people change their context, that is, using a way of transport or simply commute the place for some time. Our study (See Figure 1) shows a difference for "motivation to learn" between people that own a smartphone and those that don't own one. Individuals that own smartphone expressed to be more constantly motivated during the day when compared to non-smartphone users.

¹ Questback on-line survey platform, <http://www1.questback.com>

² An on-line link tracking platform. Bitly. <https://bitly.com/>

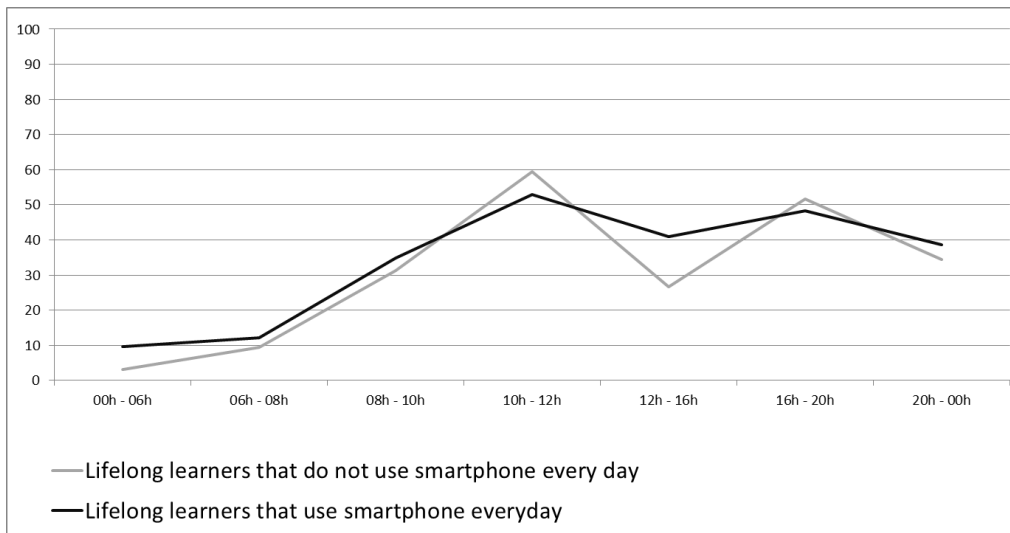


Figure 1. Motivation to learn during the day. Smartphone users vs. non-smartphone users.

A study by Eoff (2011) based on one week click data in the bitly on-line link tracking platform², concluded that tablets (iPads) usage during the day is not flat and drastically different when compared to other type of devices, including smartphones and portable computers. These results suggest that usage lowers after breakfast, remains low during traditional working hours and does not peak until much later in the evening (19h to 0h). The results of the questionnaire for lifelong learners suggest that there is an association between tablet users and their motivation to learn. The percentage of tablet users motivated to learn was 10% higher than with individuals that do not use tablets (See Figure 2). In relation to the peak observed late in the evening by Eoff (2011), our results show that the learning-motivation-curve in tablet users in the last hours of the day does not descend so much in comparison to non-tablet-users.

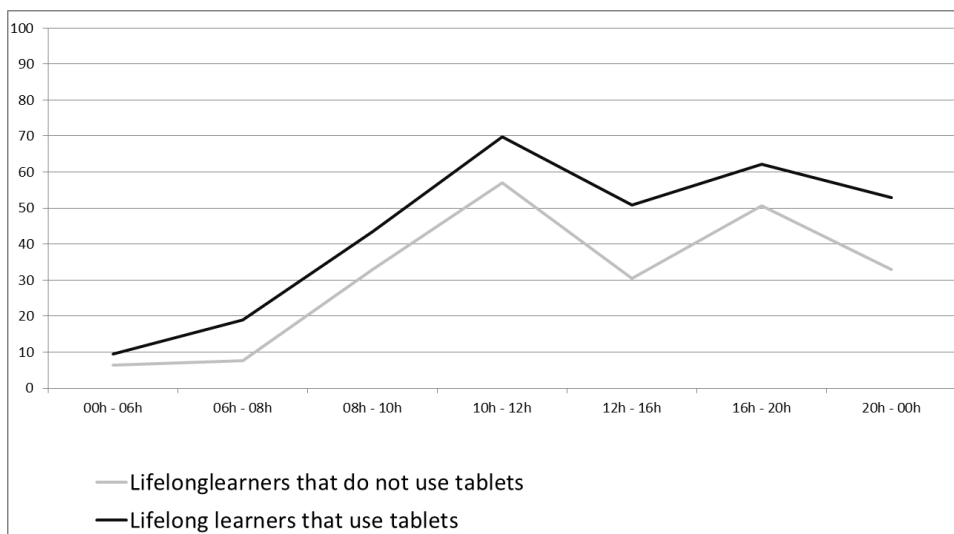


Figure 2. Motivation to learn during the day. Tablet users vs. non-smartphone users.

Eoff's results (2011) suggest that tablets are mainly used for entertainment purposes since they are less used than the rest during working times. Tablet usage is higher in comparison to the rest of the devices during leisure time. This effect can be also observed during the weekends when tablets usage between 8h and 15h is higher than it is during the week at those same hours. No other device sees a heavy increase of use during the weekends.

When asking lifelong learners on which days of the week, do they spend more time with their mobile device(s), our results show (See Figure 3) that usage for smartphone-users is flat with a slight peak on Fridays and there is always a

² An on-line link tracking platform. Bitly. <https://bitly.com/>

higher percentage in comparison to non-smartphone users. There is an increase of 30% in non-smartphone-users from a working day (Thursday) to weekend day (Saturday).

There are different ways of consuming multimedia contents with mobile devices, these are, listening, reading, writing, watching, and gaming. When lifelong learners were asked how long on average they spend on each of these ways of interaction, 21% of the individuals reported to listen more than one hour per day to their mobile devices. This preference for listening can also be inferred from the results. Media players are used at least once a week by 64.62% of the respondents.

When lifelong learners were asked how much time do they spend on different topics per day, the outcome was that *study*, *music* and *social networking* are the activities on which they spend most of their time. In contrast to these results, the study performed by Arbitron (2011) with similar topics, indicates that messaging, browsing, social networking and voice are the activities on which individuals spend more time.

Examining the way how individuals check their mobile phone for a new SMS, missed call, email or any other notification, there are two different behaviours that can be gathered from the results of the questionnaire. There is a first group of individuals (37.41%) that only check incoming notifications when the device warns them with an alert. The second group's behaviour is performed by the individuals (34.68%) that check it continuously, this means, at least once per hour. Comparing behaviours between genders, it is remarkable that the option "I only check my mobile when it alerts me" was answered by 44% of the men and 28% of the women. Women's behaviour was more evenly distributed among the rest of the options ("once a day" and "once every four hours").

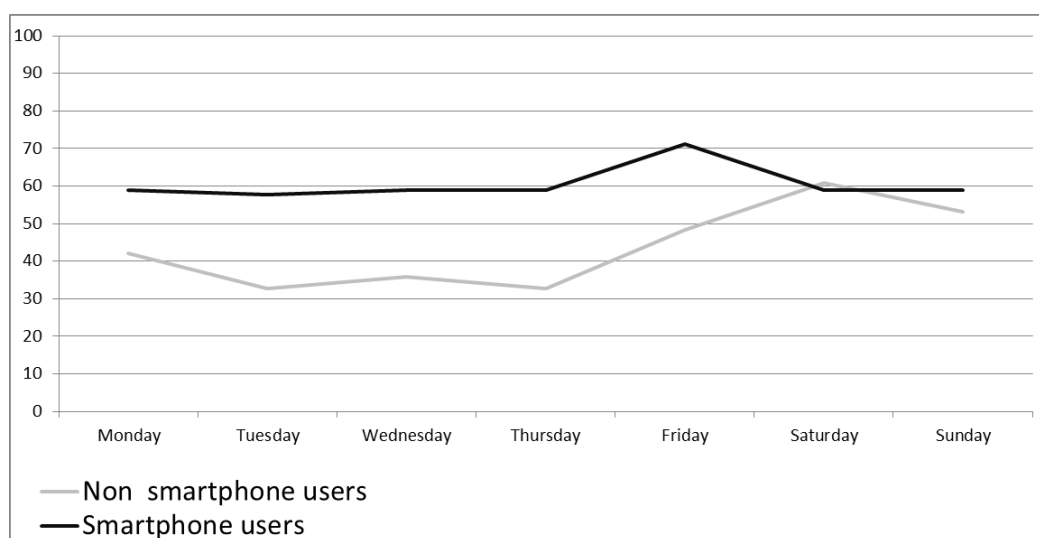


Figure 3. Mobile device(s) usage during the week. Smartphone users vs. non-smartphone users.

Linking locations, activities and ways of interaction with mobile devices

A study performed by Media (2011) on 5013 adults who identified themselves as using their smartphones to access the Internet, concluded that there are two main situations where they use smartphone. These are being at home (93%) and on-the-go (87%). Moreover, adults were requested for which activities they also use Internet on their smartphone. The highest rate was obtained (59%) for the activity "Waiting (in the line at the market, doc, office, bus, etc.)". The questionnaire for lifelong learners has focused on these three main contexts including six items with the aim to identify patterns that link locations (living-room, kitchen, bathroom, working/sleeping room, on-the-move and, waiting for someone), actions normally performed in those locations (e.g. having breakfast, brushing your teeth, lying on bed, and etcetera), and ways of interaction with mobile devices (listen, watch videos, write and read), also defined as *learning activities* by Tough (1971). These results have raised some interesting differences regarding the way in which participants reported to behave depending on their gender.

Being at home

Sitting in the sofa is the most popular place to interact with mobile devices, not only compared to any activity performed being in the living-room or anywhere at home, but also outdoors and on-the-move. Exactly 62.58% of respondents reported that they normally *read* contents, 50.34 % *write* contents, 44.89% *watch videos* and 34.01% *listen* to audios while being in the sofa. The *living-room* was reported to be the most popular place to read contents, and specifying more, being *sat in the sofa* and *watching TV during advertisement time* (47.61%). There was also a high rate of respondents that reported to write contents while *watching TV during advertisement time* (32.64%).

The main finding that can be gathered from responses regarding the context *being in the bathroom* is that, this intimate place has a significant association with mobile device interaction when used for *listening*, that is, the individuals reported to listen while *having a shower* (23.12%), *making-up/shaving* (18.36%) and *brushing their teeth* (18.36%). Being *on the toilet* is the most compatible activity with the different ways of interaction, that is, 33.33% of the respondents used their mobile device to read, 21.08% to write and 11.56% to listen. The poll performed by (Media, 2011) stated that 39% of the adults had used the Internet on their smartphone while using the bathroom, and 8% while taking a shower/bathing.

The majority of the respondents (54.42%) reported that they normally read contents on their mobile devices while *being sat at the desk*, 51.69% read, 37.41% listen and 29.92% watch videos, this means, that the desk is the best place to interact with mobile devices while *being in the room*. Furthermore, the bed is suited to interact with mobile devices reading (50.33), listening (34.69), watching (34.01%) and writing (33.32%).

The kitchen is a location associated to perform learning activities while “listening” on mobile devices. The results from this questionnaire suggest the same effects than the ones observed to the context *being in the bathroom* where mobile devices are mainly used for listening. The main contexts where participants embed their listening-learning-activity are while *cooking* (30.6%) and *heating the breakfast* (25.84%). It is only remarkable that 16.32% of the respondents interact with their mobile devices to *read* contents while cooking, probably requesting cook-recipes or short messaging while boiling, frying or anything in the oven. The survey by Media (2011) indicated that 27% of the participants had used the Internet on their smartphone while cooking/and or other household chores.

Waiting

Results depict that *waiting for someone/something* is not a context in which respondents consume video contents in contrast to the rest of ways of interaction, since the rates are low varying from 15.64% (being in the airport) to 4.76% (waiting in a commercial centre). The bus stop (43.52%) and the train station (41.49%) are the most suitable places to interact with mobile devices reading contents while waiting for someone/something. When writing on mobile devices, the highest rates are evenly distributed (approximately 38%) for the following contexts: waiting at the bus stop, at the train station and anywhere in the street.

On-the-move

The results from the study performed by Kim, Jimwoo, & Yeonsoo (2005), indicate that the most common context for using mobile Internet is described as follows: *participants have a hedonic goal, their emotional state is high, their legs are stopped, visual and auditory distractions were low, few people are around them, and their interaction is low*. This is a different picture from the widely held belief that the mobile Internet would be used often while moving outdoors. However, mobile devices have improved their capabilities to access the Internet since 2005, e.g. bigger displays, touch screens and faster connections and mobile interaction with smartphones is different nowadays. Our results suggest that interaction with mobile devices on-the-go is mainly carried out *listening*, being 51.69% train, 50.33% bus, and walking 48.3%. *Reading* contents is the second most popular way of interaction when moving, being 50.33% by train, 40.82% by bus, and 36.73% accompanying the car driver. The train is the most popular place to interact with mobile devices while *listening, reading* and *writing*, and the plane is the most popular place to *watch* videos. The poll performed by Media (2011) stated that 43% of the individuals had used the Internet on their smartphone while commuting to work/school and 20% driving by vehicle.

Gender

Regarding the gender effects, our results show some evidence on the fact that certain learning activities were more pronounced in men than in women and vice versa. On the one hand, there are a 44.18% of men that reported to use their mobile devices reading contents while being sat on the toilet, however only 18.02% of the women do so. This difference was also notable for writing contents (29.05% men vs. 9.83% women) and watching videos (15.11% men vs. 3.27% women). However, gender did not moderate the effects of listening contents. On the other hand, differences were also found regarding to listen to contents in some particular places. Women reported to be more willing to use their mobile devices while cooking (42.60% women vs. 22.08% men), sorting groceries (26.21% women vs. 5.81% men) in the kitchen, and cleaning in the living-room (49.16% women vs. 29.05% men). Moreover, it is remarkable that for the context *waiting for someone/something in a commercial centre*, 37.24% of the men reported to read contents in their mobile devices while only 16.38% of the women reported so.

	Listen	Watch	Write	Read
In the living room				
Having breakfast	12,24	8,16	8,84	29,24
Cleaning	37,4	1,36	0,68	2,04
Sitting in the sofa	34,01	44,89	50,34	62,58
Having lunch	11,56	10,88	8,84	20,4
During cofee/time	19,72	11,56	27,2	38,77
Watching TV, during advertisement time	12,92	15,64	32,64	47,61
In my room				
Waking up in the morning in bed	18,36	2,72	7,48	25,84
Getting dressed	19,72	0,68	1,36	2,04
Sitting at my desk	37,41	29,92	51,69	54,42
Lying on bed anytime	34,69	34,01	33,32	50,33

Figure 4. Learning activities in context with mobile devices. Percentage of individuals.

	Listen	Watch	Write	Read
In the living room				
Having breakfast	-7.08	-5.65	9.5	5.16
Cleaning	-20.1	-0.47	-1.63	-2.11
Sitting in the sofa	-0.72	9.5	-0.82	3.28
In the bathroom				
Having shower	-2.49	1.16	0	1.16
Sitting on the toilet	2.95	11.83	19.22	26.15
In my room				
Waking up in the morning in	6.17	4.64	9.98	4.95
Getting dressed	-5.5	1.16	-3.27	0.68
Lying on bed anytime	11.67	16.11	9.33	13.2
In the kitchen				
Preparing breakfast	-11.85	2.05	-2.38	-0.32
Sorting groceries	-20.4	0	0.68	-5.39
Cooking	-20.52	1.58	-1.9	-8.51
Waiting for someone/something				
Anywhere in the street	-4.24	0.89	9.6	6.26
At the bus stop	-6.84	4.38	7.48	9.08
In a commercial center	-9.52	2.53	14.3	20.85

Figure 5. Learning activities in context with mobile devices. Difference in percentages between men and women. Positive numbers represent higher male percentage. Negative numbers represent higher female percentage.

Missing learning activities

Participants were asked whether they had missed in the questionnaire any other activity where they usually get along some learning episode with or without their mobile devices. They reported sport activities like “running”, “cycling” or “at the gym”, on-the-go activities like “taking a walk” or “walking the dog”, and some other miscellaneous ones like “having lunch/dinner alone in a bar”, “feeding the infant”, “taking care of infant” and “while doing some do-it-yourself labour at home (carpentry, plumbing...)”. The poll performed by Media (2011) concluded that 48% of the adults had been eating while using the internet on their smartphone, 17% walking their dog and 13% playing sports. Another respondent reminded us that there are no patterns for every situation and he/she reported “*I just learn something when I find the time*”.

Difficulties when learning with mobile devices

Wong (2010) identified ten seams by which learning experiences are disrupted today and for which Mobile-assisted Seamless Learning (MSL) technology has to find new solutions. The identified ten gaps (MSL1-10) in seamless learning support are of high relevance for lifelong learners. Participants were asked about seven of these ten gaps in two items of the survey. The remaining three gaps (MSL5, 9, 10) were too complex concepts to deal in this poll and will be treated in suitable future studies.

The above paragraphs “*On-the-move*” and “*Patterns based on type of device, lifelong learners’ behaviour*” provide evidences to confirm the existence of both “*across location*” (MSL4) and “*across time*” (MSL3) gaps in the participants. Some cues are also exposed on how to resume these gaps supported with mobile technology. Participants were requested to report how often do they encounter these difficulties (MSL1-3 and MSL6-8) when learning and assisted with their mobile devices. The results from the questionnaire indicate that participants, varying from 12% to 17% in the different MSLs “usually” find these difficulties. Nevertheless, approx. 34% of the respondents reported “not a difficulty” in all these difficulties. The most remarkable difficulty is “find suitable slots of time during the day” with a 21.08% of the respondents that reported to have it “usually” and a 4.76% that find it “always”. Slightly higher rates to the three resting difficulties, and with similar rates between them were “Combined use of multiple device types (laptop, mobile phone and/or tablet)” and “Linking real world to what I learned digitally” with approximately 17% of the respondents that “usually” found these difficulties.

An extended study performed by Eurostat (2011) concluded that the two most commonly cited obstacles to participation in education and training among those who wanted to participate but did not do so were: lack of time due to family responsibilities (36.6 % of those not participating); conflict with work schedules (35.0 %).

DISCUSSION AND CONCLUSION

The aim of this questionnaire for lifelong learners is to analyse learning daily activities in adults, and recognize patterns in lifelong learners, in order to shed light on new ways to support them with technologies. Results obtained in this questionnaire arise the 10 following findings:

1. Portable computers are the most used type of device. Recent studies (Wesel, 2011) (Wesel, 2012) have found similar results arguing ergonomic reasons. Furthermore, students preferred bigger screen compared to smartphones or tablets. Moreover, we think that portable computers are supplanting the heavy desktops because the drop in the prices (Tapellini, 2011) (Kharif, 2009) in the last years.
2. Individuals that own a smartphone reported to be more constantly motivated to learn during the day than non-smartphone users.
3. Individuals that own smartphone use them constantly during the whole week. The rest of the individuals reported lower usage during working days and an increase during the weekends.
4. Listening is the most compatible learning activity when performing other tasks at the same time. It is also the one where adults spend more time and in longer time-slots. These results suggest that audio is very suitable for distributing learning materials. Audio contents can be consumed from any media player, which are very affordable since they can be found independently or embedded in most of the phones.
5. There are two different behaviours when adults check their mobile phone for a new SMS, missed call, email or any other notification. There is a group that only checks incoming notifications when the device warns them with an alert. There is another group that check it continuously. These results suggest that two behaviours must be taken into account when building mobile applications for learning. Users attend to notification coming from his/her mobile device: continuously polling; check based on warning event (vibration, sound, icon on the screen desktop...).
6. There is an association between the learning activity being performed (reading, listening, writing, or watching) and the concrete location where it takes place. Some patterns were found in the way to interact with mobile devices while being at home and depending on the room where the individuals were located. Participants were more willing to perform any kind of activity with their mobile device(s) while being *in the living room* or *in the sleeping/working room*. Nevertheless, participants reported that *the kitchen* and *the bathroom* were places where they use to perform the “listening” learning activity.
7. Learning activities are mainly performed when adults are with their legs stopped. The “reading” and “writing” learning activities mostly take place being sat (sofa, desk, train, bus and toilet) or lying on somewhere (bed). *Sitting in the sofa* is the concrete place where adults reported the higher acceptance when carrying out any learning activity. However, the “listening” learning activity that takes part more evenly in the different locations and embedded in different activities.
8. Men and women behave in a differently when making use of their mobile devices. These results suggest that man and women seem to behave differently, not only in the way to perform learning activities depending on the context, but also in the way to attend to an incoming notification on their mobile phones. Furthermore, the study performed by (Ofcom, 2010) stated that men spend nearly an hour more per day using media than women.
9. Lifelong learners reported that their learning experiences are disrupted. Finding a suitable time slot to learn during the day is the most frequent difficulty reported by participants. These results and the ones by Eurostat (2011) suggest that there is a need to integrate learning activities in daily life.
10. There is a high rate of individuals that are not familiarized with the concept of “lifelong learning”.

The authors of this paper strongly believe that the combined use of multiple devices will support lifelong learners to build their own Personal Learning Ecologies (PLE). On the one hand, lifelong learners are typically active in several parallel learning tracks, which they have to manage. This can be inferred from the above mentioned study (Media, 2011) stating that 72% of the users could operate with books, personal computer, watch TV or listening, while using the Internet on their mobile device (multitasking). On the other hand, the results from this questionnaire position the smartphone as a potential key element to link learning across locations, time, and supporting lifelong learners to keep the pace of the motivation while changing the context. This fact positions smartphones as a key element to track adults' PLEs, since they provide a continued presence in learning activities. As adults advance anytime and anywhere completing learning episodes, they are getting along their self-organized personal learning.

We will extend this research creating a lifelong learner-centred model in which smartphones will be able to interact with smart objects (ambient displays, sensors, learning containers, etc.) that could trigger different activities and lead to

learning events. Moreover, we will define how channels and artefacts can be related in order to adapt and serve the information according to adults' preferences (location, embedded in learning activity, time of the day, duration of the task, gender, etc.).

ACKNOWLEDGEMENTS

The authors would like to thank The Netherlands Laboratory for Lifelong Learning (NELLL) for their support in this research, and Natalia García Gracia, Guido van Dijk, Dominique Verpoorten for distributing and providing participants at CETA training skills academy (La Almunia de Doña Godina, Spain), Connect College (Echt, The Netherlands), and European School (Mol, Belgium) respectively.

REFERENCES

- Alexander, C. (1977). *A Pattern Language: Towns, Buildings, Construction*. USA: Oxford University Press
- Arbitron, M. (2011). *No prime time for Smartphone*. Retrieved from <http://www.zokem.com/2011/06/no-prime-time-for-smartphone>
- Attwell, G. (2007). *Personal Learning Environments-the future of learning?*. eLearning Papers , 1-8
- Eoff, B. D. (2011). *How We Use the Tools We Choose: A Week of Worldwide Usage Data*. Retrieved from http://www.readwriteweb.com/archives/does_your_device_change_the_way_you_use_info.php
- European C. (2011). *Making a European area of lifelong learning reality*. Retrieved from <http://www.bologna-berlin2003.de/pdf/MitteilungEng.pdf>.
- Eurostat. (2011). *Lifelong learning statistics*. Retrieved from http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Lifelong_learning_statistics.
- Fischer, G. (2000). *Lifelong Learning-more than training*. Journal of Interactive Learning Research , 1-22
- Kharif, O. (2009). *How Low Can PC Prices Go?* Bloomberg businessweek. Retrieved from http://www.businessweek.com/technology/content/mar2009/tc20090310_258460.htm
- Kim, H., Jimwoo, K., & Yeonsoo, L. (2005). *An Empirical Study of Use Contexts in the Mobile Internet, Focusing on the Usability of Information Architecture*. Information System Frontiers , 175-186.
- Media, G. O. (2011). *The Mobile Movement Study*. Retrieved from <http://www.slideshare.net/uginwong/2011-the-mobilemovement>
- Ofcom. (2010). *Communications Market Report*. Retrieved from http://stakeholders.ofcom.org.uk/binaries/research/cmr/753567/CMR_2010_FINAL.pdf
- Rohse, S., & Anderson, T. (2006). *Design patterns for complex learning*. Journal of Learning Design , 82-91
- Tabuenca, B. (2012). *A questionnaire for lifelong learners on mobile usage habits*. Open Universiteit in the Netherlands, NELLL. Heerlen: DSpace. Retrieved from <http://hdl.handle.net/1820/4296>
- Tapellini, D. L. (2011). *Laptop Ratings: Price drops even steeper than usual*. Retrieved from <http://news.consumerreports.org/electronics/2011/08/laptop-ratings-price-drops-even-steeper-than-usual.html>
- Tough, A. (1971). *The adult's learning projects. A fresh approach to theory and practice in adult learning*. Ontario Institute for Studies in Education , Toronto
- Vavoula, G., & Sharples, M. (2002). *KLeOS: A personal, mobile, Knowledge and Learning Organisation System*. Proceedings of IEEE International Workshop On Wireless and Mobile Technologies in Education
- Wesel, M. V. (2011). *Maastricht University Mobile and Laptop Survey 2010*. Retrieved from <http://librarywall.maastrichtuniversity.nl/wp-content/uploads/2011/01/Maastricht-University-Mobile-and-Laptop-Survey-2010.pdf>
- Wesel, M. V. (2012). *Maastricht University Mobile, Laptop & Tablet Survey 2011*. Retrieved from <http://librarywall.maastrichtuniversity.nl/wp-content/uploads/2012/01/Maastricht-University-Mobile-Laptop-Tablet-Survey-2011.pdf>
- Wong, L. (2010). *What Seams do We Remove? - The Ten Dimensions of Mobile-assisted Seamless Learning*. ICCE 2010. Retrieved from http://www.icce2010.upm.edu.my/tbs_lhwong_abstract.html