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***M-Easy**: Improving the Integration of Low-Skilled Adults Through Developing Mathematical Skills and Community Support.*
Project No. 2017-1-LT01-KA204-035129

State of Art Report

„Needs Analysis for Upgrading Learners' Basic Mathematical Skills"

Summarized by Social Innovation Fund

February 2018, Kaunas, Lithuania

Contents

I. Introduction to the Project M-Easy: Improving the Integration of Low-Skilled Adults Through Developing Mathematical Skills and Community Support

The project contributes to achieve Europe 2020 benchmarks: to decrease the number of low-skilled adults in mathematical skills up to 15%, to increase the employment rate by 75%; to increase adults' participation in lifelong learning by 15%.
OECD's PISA study (2012) shows that low achievers in maths in EU-28 is 22% and the number varies significantly across these countries: 15% in Poland, 19% in Austria, 23% in Italy, 26% in Lithuania, and 42% in Cyprus.
According to the Survey of Adult Skills (PIAAC), conducted in 2014-2015, almost all EU-28 countries have a big demand on increasing the low levels of adults' skills at problem-solving in technology-rich environments: LT-45%, PL-40%, CY-38%, AT-25%, IT-45%.
According to Eurostat (2016) 35.5 % of the 25–54 year-old non-EU-born population has attained only pre-primary, primary or lower secondary education.

Education plays a crucial role in helping low-skilled migrants and refugees to settle in new countries. Thus, the project has two aims:

- To supply high quality ICT-based learning opportunities for improving basic mathematical skills of low-skilled adults, including refugees, asylum seekers and migrants **(O1 and O2);**
- To increase awareness within the local communities about the importance of educational help for low-skilled adults, including refugees, asylum seekers and migrants **(O3).**

The project's objectives are the following:

1. To improve the integration of low-skilled adults through developing their mathematic skills by using a problem-solving ICT-based approach;
2. To monitor, assess and collect learners' achievements in order to facilitate the validation of obtained basic skills;
3. To extend and develop educators' competences needed for effective training of the low-skilled;
4. To increase engagement of local communities to foster inclusion and integration of low-skilled adults through education and learning.

Project's target groups:

- Low-skilled adults, including refugees, asylum seekers and migrants: 80 will be involved in piloting;
- Adult educators/facilitators engaged in mathematical skills training of the low-skilled: 17 will be trained within the learning activity and 80 will be involved in the multiplying events;
- Adult educators/practitioners working in the field of community education: 80 will be involved in piloting

Three intellectual outputs will be produced:
O1 - Training course for developing of mathematics skills 'M-Easy';
O2 - Toolkit for adult educators "Developing competences needed for effective running of 'M-Easy' training course";

O3 - Training material for local communities' workshop "Success of the inclusion and integration of low-skilled adults through education".

The general methodology to all 3 intellectual outputs is based on Open Educational Resources in order to promote open access to the developed educational tools. However, each outcome is based on the methodology which is specific to this outcome. The methodology of the training course 'M-Easy' for low-skilled adults, including refugees, asylum seekers and migrants is based on open and innovative digital era Mobile applications approach using problem-oriented experiential learning, blended learning and reversed training. The Toolkit for adult educators is a set of online methodical materials to ensure effective facilitation of 'the M-Easy' training course for the low-skilled. The methodology is based on self-directed e-learning as a Toolkit and will be openly accessible within the virtual environment. Training materials for adult educators-practitioners on how to run local communities' workshop on raising awareness of the importance of education system for inclusion and integration of the low-skilled, including refugees, asylum seekers and migrants will be based on the reversed training methodology using OERs (digital case studies). These training materials will also present the development within the project 'M-Easy' training course in order to give a possibility for citizens to be active and to provide this information within their local communities.

The expected impact on the low-skilled, including refugees, asylum seekers and migrants will be their better integration into the labour market and society through education and improved level of their mathematical skills for at least 40%.

O1 -Training course for developing mathematics skills 'M-Easy' will comprise:
***O1-A2* e-Directory (Collection)** of the Existing Mobile Apps (games) related to basic mathematical skills as the first step to develop math skills;
O1-A3 **Learner's Support Corner** with a possibility to access a Facilitator to ask questions, to get a feedback and active support, to present and discuss personal achievements during the training and to get advice for validation of skills and competences;
***O1-A4* Assessment and Testing Area** with pre-testing and final testing to assess personal skills in mathematics before and after the training course in order to account the impact (planned is 40% of increasing the level of math skills);
***O1-A6* Learner's Guide** – both printable (pdf) and online versions with short video introductions and step-by step explanations about how to manage learning via virtual learning environment and mobile applications;
Mobile part *(O1-A5, A7)* will consist of the developed **Mobile Applications (Apps)** oriented to further develop the mathematical skills like through the exercises of the **problem solving** like managing money-pocket, managing of the home by renting, maintenance and renovation of the home; currency and bank operations; health issues, time management etc. **Around 20 Mobile Apps** will be developed.

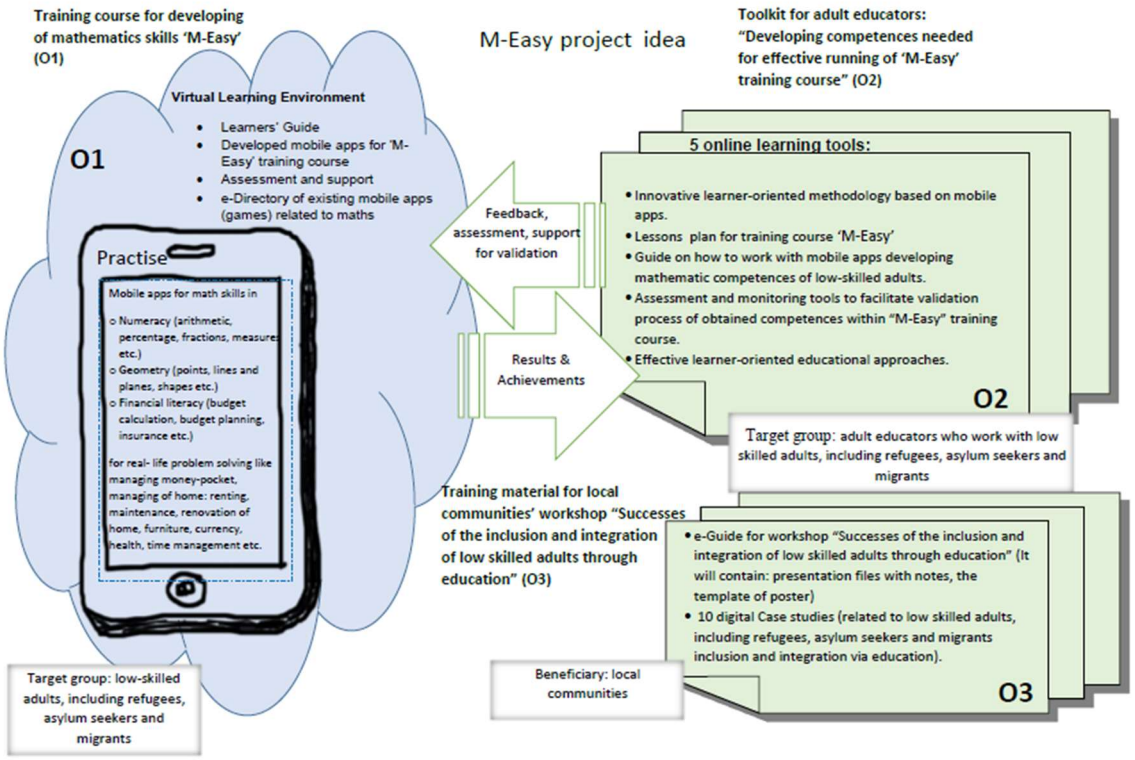
O2- Toolkit for adult educators: "Developing competences needed for effective running of 'M-Easy' training course" has the main aim - to ensure effective facilitation of the 'M-Easy' training course by adult educators. The Toolkit for adult educators is a set of online methodical materials and consists of five interconnected online learning tools:

O2 – A1 Open and innovative digital era Mobile applications (Apps) methodology for better outreach of the low-skilled learners;
O2 – A2 Lesson plans for the training course 'M-Easy';
O2 – A3 Guide on how to work with the problem-solving Mobile Apps on developing mathematical skills;
O2 – A4 Assessment and monitoring tools to facilitate the validation process obtained within the 'M-Easy' training course skills and competences;
O2 – A5 Effective learner-oriented educational approaches for low-skilled refugees, asylum seekers and migrants.

O3- Educational workshop for Local Communities "Success of the integration of low-skilled adults through education"
The aim of this workshop is to develop a set of specialised online educational materials and handouts for adult educators-practitioners, to use them freely and openly while organising educational workshops within local communities.
This intellectual output O3 corresponds to the project's objective: to develop adult educators' civic competences, particularly in training of local communities in order to engage them in fostering inclusion and integration of low-skilled adults through life-long learning.

The training material for the workshop will consist of:
O3 – A1 Collection of digital case studies with success stories of low-skilled adults, including refugees, asylum seekers and migrants on integration via education;
O3 – A2 e-Guide for workshop "Success of the integration of refugees, asylum seekers and migrants through education".

Figure 1. Correlation between M-Easy Project's Outputs and Activities



II. The objectives of the „Needs analysis for upgrading learners' basic mathematical skills"

According to *Key competences for Lifelong Learning European Reference Framework* **"Mathematical competence is the ability to develop and apply mathematical thinking in order to solve a range of problems in everyday situations**. Building on a sound mastery of numeracy, the emphasis is on the process and activity as well as knowledge. Mathematical competence involves, to different degrees, the ability and willingness to use mathematical modes of thought (logical and spatial thinking) and presentation (formulas, models, constructs, graphs, charts)

Necessary **knowledge** in mathematics includes a sound knowledge of *numbers, measures and structures, basic operations and basic mathematical presentations, an understanding of mathematical terms and concepts, and an awareness of the questions to which mathematics can offer answers.*

An individual should have the **skills** to apply basic mathematical principles and processes in everyday contexts at home and at work as well as to follow and assess chains of arguments. An individual should be able to reason mathematically, understand mathematical proof and communicate in mathematical language and to use appropriate aids.
A **positive attitude** in mathematics is based on the respect of truth and willingness to look for reasons and to assess their validity"[1].

The objectives of the „Needs analysis for upgrading learners' basic mathematical skills" are the following:

- To analyse the situation in partner countries on existing training for low-skilled adults on developing mathematical skills, the necessity to improve such training and using of Apps to increase learners' motivation to develop their maths skills.
- To select the range of mathematical skills essential for low-skilled adults, including migrants, refugees and asylum seekers which have to be developed within the project.
- To define the scope of real-life situations of low-skilled adults in which ability to apply the developed maths skills is helpful to solve a range of problems in everyday situations

The Transnational Report for „Needs Analysis for Upgrading Learners' Basic Mathematical Skills" is a basis for development of the Training course 'M-Easy'.

[1] European Commission, Key competences for Lifelong Learning, European Reference Framework. Luxembourg: Office for Official Publications of the European Communities, 2007

III. Methodology of the Needs analysis for upgrading learners' basic mathematical skills

The methodology of the Needs analysis was based on the focus groups with adult educators/trainers/social workers/consultants/teachers working with low-skilled adults, including migrants, refugees and asylum seekers.

Method: a focus group is a form of qualitative research in which a group of people are asked about their perceptions, opinions, beliefs and attitudes towards a product, service, concept, advertisement, idea. Questions are asked in an interactive group setting where participants are free to talk with other group members. A focus group is an interview, conducted by a moderator among a small group of respondents. The interview is conducted in an informal and natural way where respondents are free to give views from any aspect.

Some tips for moderation of the Focus group have been recommended:

- To remind participants that there are no right or wrong answers, only different points of view; free expressions and opinions are welcome;
- To record the audio of the discussion with the permission from the participants;
- To involve at least two people in organising the Focus group discussion: one person has to take notes, while the other has to talk to the members of the focus group.

Besides the group discussion, the participants of the focus group were asked to fill in an individual questionnaire in order to collect data and precisely summarise their opinion and knowledge in very concrete questions concerning the subject – the development of the mathematical skills for low-skilled adults.

The Focus group meetings at national levels have been organised according to the Agenda (see Annex 1).

The main tasks for the Focus groups were the following:

- To collect and cumulate information according to the prepared questionnaire (see Annex 2) about the situation in partners' countries on existing training for low-skilled adults on developing mathematical skills.
- To discuss and define the most important basic mathematical skills according to the Key Competences for Lifelong Learning European Reference Framework using template (Annex 3);
- To brainstorm and create scenarios of 2-3 (per partner) problem-oriented reallife situations (tasks) related to mathematical skills which could be developed as APPs for adult training, for example, 1) Renovation of the house, 2) Managing the bank

loan; 3) Managing the pocket money etc. (using ideas about the problem-oriented situations defined in Annex 4).

IV. Information on the Focus Groups' meetings in the partnership countries

Project's M-Easy partners Danmar, CARDET, CSC, KRSC and SIF have organised focus groups of adult educators: 7 - 12 participants per partner. Thus, the total number of adult educators, 46, expressed their opinion about the topic.

The focus groups by the partners were organized according to the Focus Group Meeting Agenda (see Annex 1) elaborated by the leading partner, SIF, and they took place as follows:

CARDET
Date of the focus group meeting: 29 November 2017
Place of the focus group meeting: CARDET Offices and The Classic Hotel, Nicosia, **Cyprus**
Number of participants: 12

Centro per lo Sviluppo Creativo Danilo Dolci - CSC
Date of the focus group meeting: 11 December 2017
Place of the focus group meeting: Palermo – **Italy**
Number of participants: 7

Danmar Computers
Date of the focus group meeting: 20 December 2017
Place of the focus group meeting: Danmar's office, Hoffmanowej 19, Rzeszów, **Poland**
Number of participants: 11

Kaunas Region Educational Centre - KRSC
Date of the focus group meeting: 15 December 2017
Place of the focus group meeting: KRSC office, Saulės g. 12, Kaunas, **Lithuania**
Number of participants: 8

Social Innovation Fund - SIF
Date of the focus group meeting: 15 December 2017
Place of the focus group meeting: SIF office, Savanoriu pr. 1, Kaunas, **Lithuania**
Number of participants: 8

The results of the national focus groups were used in the National reports on the Needs analysis (Poland, Cyprus, Italy, Lithuania). The leading partner, SIF, summarised the national reports and developed the transnational report „Needs analysis for upgrading learners' basic mathematical skills" at hand. The report in the English language is also uploaded on the project's website http://measy.lpf.lt/outcomes.html.

V. Summary Report from the Focus Groups Meetings in Cyprus, Poland, Italy and Lithuania

1. Information about the situation in the partner countries on existing training for low-skilled adults on developing mathematical skills.

The participants of the focus groups in the partnership countries were mainly adult educators, teachers and university professors. The groups discussed (using the questionnaire – Annex 2) the situation of the mathematics teaching / learning in their countries for the low-skilled adults, assessment and tools used and the possible ways to motivate people, to improve their mathematical skills with the help of modern digital era technologies, mobile Apps.

Table 1. *Summarized answers from the discussions of the focus groups' meetings.*

1. What is your experience in training of the low-skilled adults? Could you briefly define the term 'low-skilled'?
Poland The vast majority of participants had experience in working with low- skilled adults (most of them are people from rural areas). At the beginning, the participants reminded the EU definition of low-skilled people with educational attainment ISCED 0-2. Then we all together decided that we will find the effective definition of such a person and will define him as "a person whose knowledge and skills in a specific field are at most basic, but are not related to the formal level of education." ***Cyprus*** A low-skilled adult is an adult person who cannot do simple calculations in his/her everyday life. For example, s/he goes to a place to buy something and s/he cannot calculate whether the change s/he got is correct. It means that this person's skills (of a particular discipline) are not adequately developed in order to perform in a satisfactory way. ***Italy*** Most of the participants in the focus group have experience in dealing with low-skilled adults in these fields: at school, at guidance centres and in project management; only one person works at university, thus, with high skilled adults. However, his contribution points out that even in his specialised field lack of some basic skills may occur.

All of them agreed considering 'low-skilled' as a person who did not receive any tool which allows him to build a personal guidance, thus, to develop his skills and a personal study method in life. Nowadays, this is related to the lack of digital education, especially when it comes to migrants.

Lithuania

The participants said that they still face a lot of interference and confusion in training low-skilled adults (including migrants and refugees). Most of the refugees who arrived in Lithuania have no purpose to stay here and they do not seek to learn. On the other hand, those refugees and migrants who are skilled in mathematics do not speak or know Lithuanian and encounter difficulties with concepts.

The participants defined "low-skilled" adults as people who do not have basic knowledge which could be applied in their everyday life. Some participants described low-skilled persons as the ones who have low or no qualifications required to perform qualified jobs. In terms of job performance, the participants described low-skilled adults as low-skilled workers.

CONCLUSIONS:

- The participants of the Focus groups in the partnership countries were mainly experienced educators working with the low-skilled adults.
- Despite the fact that the participants from different countries provided slightly different definitions of "low-skilled" adult, the "low-skilled" adult was defined as the one who lacks basic knowledge and skills that could be applied in his/her everyday life, the one who cannot make simple calculations in his/her everyday life and lacks digital education, especially when it comes to migrants
- In terms of job performance, some of the participants described 'low-skilled' people as low-skilled workers

2. Could you briefly describe the level of mathematical skills of low-skilled adults in your country taking into consideration the level of math skills of migrants, refugees and asylum seekers? Do you have experience in analysing the level of maths skills of your adult learners using special assessment tools? Is your opinion based on your day-to-day educational experience?

Poland

Most of the gathered said that the level of formal mathematics education is very low in Poland, especially among people with low education and from rural areas. This is confirmed by the results of the annual baccalaureate and sociological research. However, at the same time (based on day-to-day educational experience), everyone confirmed that in spite of these educational deficiencies, Poles (also low-skilled') are characterized by great resourcefulness in everyday life and are able to "figure out the percentage of tax or field of tiled surfaces. This is a clear trend, but it does not affect the whole society.

Half of the gathered admitted that they have experience in analysing the level of maths.
In the case of our region, this does not apply to level of math skills of migrants, refugees and asylum seekers. we cannot determine this because the phenomenon of migration does not occur in our region.

Cyprus

In general, the levels of mathematical skills are sometimes satisfactory, but usually they are low. Most of the time we see people managing their financials, e.g. at the supermarket ok, however, in some cases (also due to the exchange rates in some times), there can be confusion.
None of the participants has experience in analysing the level of mathematical skills of adult learners using special assessment tools. They stated that the importance of having such tools is in order to be able to help their participants more accurately. So far, the only assessment taking place was in the form of asking the person directly and not having objective assessment. Therefore, their opinionsare based on their day-to-day experiences with these adults.

Italy

All the participants, on the basis of their daily educational experience, agreed in assessing the general level of mathematical skills of low-skilled adults in Italy from medium to low level: it means rare technical skills and poor logical reasoning (not highly stimulated by the Italian cultural system). Nevertheless, it is necessary to pay attention to the target according to which the level changes (migrants, illiterate, educated people, etc).
Regarding the assessment tools, the only tools mentioned were visual and simple problems to solve, used by schools with low-skilled migrants.

Lithuania

It was very difficult for the participants to describe the mathematical skills of low-skilled adults, taking into consideration as the level of maths skills of migrants, refugees and asylum seekers, because this rate is not even studied in the country. Only professional skills are assessed. Regarding formal and non-formal adult education, the level of mathematical knowledge is not assessed and there is no special tool for this type of education.

CONCLUSIONS:

- Most of the participants of the Focus groups said that the level of formal mathematics education is very low in their countries taking into consideration the people with low education and from rural areas. This is confirmed by the results of the sociological research and observations of the adult educators who have had years of experience and who are able to assess mathematical skills without special assessment tools.
- Adult educators' opinions are based on their day-to-day experiences with low-skilled adults. Regarding formal and non-formal adult education in the partnership

countries, the level of mathematical knowledge is not assessed and there are no special tools for this kind of education.

- All of the participants stated that it is important to have sophisticated modern digital assessment tools in order to be able to help their participants more accurately.

3. Do you have experience in training / teaching mathematics? Do you think that special training programs are **needed** to train maths skills of low-skilled adults? How can you define the situation in your country/region/town with regard to training in mathematics for low-skilled adults? Do you think that enough attention is paid to low-skilled persons' training/teaching in mathematics? Do you **have/use a special** training program for the low-skilled? Are these courses freely-accessible (free of charge and /or developed as open educational resource?)

Poland

It is a significant problem in Poland. Teaching mathematics in the formal education system it is not profiled to different groups depending on their ability and previous education. Therefore, there is a great need of special training programs to train maths skills of low-skilled adults. Definitely not enough attention is devoted to training in mathematics for low-skilled adults: this group is often treated as "lost" and is supported on an ad-hoc basis, without providing systemic solutions and support.

The participants admitted that they do not use special training program for the low-skilled, but they would like to implement it in their classes.

Cyprus

Some of the participants of the focus groups reported that they have experience in teaching mathematics (as math teachers/trainers) in adult classes. All of the participants emphasized the importance of having special training programs for these mathematical skills (mentioned during the focus group) because they would really help the low-skilled adults. One participant, importantly, stated that mathematics is like an international language – if you know it at a good level, you can communicate at that level too.

Even though everyone acknowledged the importance of having special trainings on the topic, none of the participants could point out any specific training programs that specialize on developing mathematical skills for adults. They mentioned some general programs like occasional government-funded trainings, but those were not freely accessible 100% and they were not particular to migrants or asylum seekers.

Italy

All of the participants stated that the main problem for low-skilled adults to learn mathematics is the lack of explanation of those basic concepts through using a concrete approach and providing useful tools to be used in a daily interpretation of reality. From their opinions, it appears that the Italian context is not the most flourishing one in this educational field since it is very abstract and very poor in terms of attention given to this training sector.

No tools used for the low-skilled were mentioned, except a tool quoted by the university teacher: the “Beer Game”, used with high skilled adults, who , despite their high-level skills, still make some mistakes.

Lithuania

Some of the participants confirmed that they have experience in training/teaching mathematics. They agreed that special training programs are needed to train maths skills of low-skilled adults because there are no such special training programs. Low-skilled persons’ training/teaching in mathematics is not a priority area and really little attention is paid to it.

CONCLUSIONS:

- Adult educators from all partnership countries admitted that definitely not enough attention is paid to training in mathematics for low-skilled adults. This group is often treated as "lost" and is supported on an ad-hoc basis, without providing systemic solutions and support.
- There is a huge gap in terms of special programs and tools in teaching mathematics of the low-skilled adults in the partnership countries.
- The participants of the Focus group acknowledged that they do not use special training programs for low-skilled adults, but they would like to implement them in their classes, because special programs and tools would really help educators and low-skilled adults.

4. What, in your opinion, are the main obstacles to train low-skilled adults in mathematics: lack of motivation, lack of training programs and innovative tools for the training, lack of qualified tutors? Other obstacles?

Cyprus

The main obstacles reported by the participants of the focus groups are:

- Lack of time because most of them are working.
- It is difficult for them to change the way they think and they know some things – even though for mathematics this might not be the case, it is a potential overall obstacle regarding the general mind-set of a learner.
- Lack of motivation due to other occupations in daily life, also because they might claim that they get by with their existing knowledge and skills, of with the help of their friends and family.
- Lack of training programmes is another obstacle, as if there were any, and presented in a welcoming and attractive way, which can create meaning for the low-skilled adults, it would create better opportunities for those people.

Poland

- Lack of system solutions,
- lack of training programs and innovative tools for the training,
- lack of qualified tutors and teachers,
- lack of involvement of educational authorities in popularization of the

problem,
- fear of using new technologies in the didactic process,
- low social awareness regarding the relevance of mathematics in daily life.

Cyprus

The main obstacles reported by the participants of the focus groups are:
- Lack of time because most of them are working.
- It is difficult for them to change the way they think and they know some things – even though for mathematics this might not be the case, however, it is a potential overall obstacle regarding the general mind-set of a learner.
- Lack of motivation due to other occupations in daily life, also because they might claim that they get by with their existing knowledge and skills, of with the help of their friends and family.
- Lack of training programmes is another obstacle, as if there were any, and presented in a welcoming and attractive way, which can create meaning for the low-skilled adults, it would create better opportunities for those people.

Italy

The main obstacles underlined by the participants are the lack of a ludic approach in the teaching methods and the lack of appropriate didactic materials (most of the books follow the same structure, showing gaps in the basic skills, which are often taken for granted). This is for most of them, linked also to the lack of proper preparation given to the teachers/educators, aimed at enabling the emergence of a concrete approach and a daily applicability of mathematics in life.

Lithuania

All of the above mentioned obstacles. There is a different level of knowledge and different needs. There is no assessment tool to define the level and even more: there aren't even special created training programs.

CONCLUSIONS:

- The main obstacles to train low-skilled adults in mathematics were named as follows:
  - lack of systematic solutions: training programs and innovative tools for the training,
  - lack of qualified tutors and teachers,
  - fear of using new technologies in the didactic process,
  - low social awareness regarding the relevance and applicability of mathematics in daily life.

5. Do you already use mobile Apps in learning or teaching mathematics? If Yes, please name some of the APPs you use. If NO and you still do not use the APPs

for the training, what, in your opinion, are the main obstacles to use mobile Apps in learning / teaching mathematics (lack of equipment, lack of skills or proper tools – mobile Apps, other)?

Poland

NO!

The main obstacles to use mobile Apps in learning / teaching mathematics are a fear of

using new technologies in the didactic process and low social awareness regarding the relevance of mathematics in daily life.

In addition, the traditional fear of change.

According to the participants, public campaigns or projects promoting such solutions would be an ideal solution.

Cyprus

None of the participants uses mobile applications for learning or teaching mathematics. They pointed out that it is an important tool to have, especially with the mobile learning culture in contemporary societies and highlighted the importance of having such applications available. They claimed that if they had such applications, e.g. through a solid training programme, they would use them. They all agreed that when this project created the relevant applications, they would gladly use them. One participant mentioned that for some low-skilled adults, learning through a mobile device can be a challenge and so the applications must be user friendly and do not confuse the users.

Italy

Some of the participants use Apps in learning/teaching mathematics, for example, the following ones: Crucipixel; Kakuro; Sveglia Alert C; Logic Art; Retire Rich; Population Planner; Bacteria Sandwich; I In Inflation; Pic Oil 1o1.

The university teacher suggested an important aspect to pay attention to: when creating a game/app, it is necessary to build a transparent system where the players can understand the final logic reasoning at the basis of the game and its final goal instead of just solving the problem without a real understanding (game mentality called black box)

The ones who said that they did not use apps in their teaching/learning habits agreed anyway on considering apps useful to learn, but only as an additional tool to be combined with a training course.

Lithuania

Some of the participants use APPs in teaching mathematics, but they are facing with such problems like lack of skills, lack of equipment, different languages. It's quite a different situation talking about the apps for math teaching/learning in Lithuanian. There are few math apps in our national language. The available apps are suitable more for children than adults. There are no such applications in which mathematical skills would be combined and used in everyday life.

CONCLUSIONS:

- Only few participants of the Focus groups in Italy and Lithuania mentioned that they use Apps in the teaching / learning process of mathematics.
- For the majority of adult educators, the main obstacles to use mobile Apps in the teaching process are the following:
    - fear of using new technologies in the didactic process,
    - low social awareness regarding the relevance of mathematics in daily life, fear of change,
    - in participants' words, the main reason is the lack of appropriate mobile Apps for learning/teaching adults mathematics, especially in all national languages of the partnership countries. New solutions and tools for learning / teaching mathematics using mobile Apps would be very welcome. .

6. Within the M-Easy project, we plan to collect an e-Directory of already existing mobile Apps dedicated to learn mathematics. Do you think this tool (e-Directory) can help adult educators to start teaching maths using APPs?

Poland
Definitely yes!
Such collection along with recommendations of the most effective methods of application would be a good starting point. The participants stressed the need to prepare national versions due to limited knowledge of the English language among teachers and tutors of adults and low-skilled adults.

Cyprus
The participants believe it can inspire learners with more ways of teaching maths (and learning of course).
It will provide adult educators a great set of tools for teaching and the participants agreed that if there is such collection with descriptions of what each application can do, a set of learning objectives and particular activities, it would be greatly appreciated and widely used.

Italy
Yes, all agree that the e-Directory can be partially useful for learning mathematics as an additional support tool, but it cannot be exhaustive in teaching.

Lithuania
All of the participants agreed that such e-Directory of existing mobile Apps is really needed and could help adult educators to start teaching mathematics using APPs.

CONCLUSIONS:

- The majority of the participants of the focus group agreed that one of very good and supportive tools could be the e-directory of existing mobile Apps dedicated to learning mathematics.
- Such collection along with recommendations of the most effective methods of application would be a good starting point.
- The participants stressed the need to prepare national versions due to limited knowledge of the English language among teachers and tutors of adults and low-skilled adults. It can inspire learners with more ways of teaching and learning mathematics.
- It would provide adult educators with a great set of tools for teaching and it should contain descriptions of main applications' features, a set of learning objectives and particular activities.

7. What do you know about the digital skills and practice of the low-skilled adults you teach/train? Do you think that innovative digital era tools like mobile Apps oriented in solving a range of problems in everyday situations could increase motivation of low-skilled adults to learn and improve their mathematical skills?

Poland

Yes, but it must be preceded by some motivational and promotional introduction. The mere transfer of tools will not make use of them among the target group.
However, it should be emphasized that low-skilled adults are not digitally excluded and most of them successfully use smartphones. Therefore, there is a good chance of success of the solution proposed by the M-Easy project, especially among the younger part of low-skilled adults (which incidentally have the biggest problems with mathematical skills).

Cyprus

The participants said that their adult learners are always curious to learn more, but some of them are hesitant at the beginning of something new. The "fear of the unknown" is always an obstacle to get over at the beginning and start taking small and steady steps in order to develop their math skills.
The participants also said that even though the new digital tools might increase engagement for some people, they could decrease it for some others, depending on their age and existing tech skills, as well as whether they have a mobile device such as smartphone or tablet.

Italy

This question received very different answers: all agree that digital skills are considered necessary nowadays, and as well as the capability to use mobile apps in everyday life (which is a huge limit for most of the migrants, who don't have, most of the times, digital literacy skills which excludes them from the

labour market). For one participant it is better to use digital tools for learning (they are free, open and comfortable, you can learn at any time and in any place).
Despite this, all of them agree considering this digital competence useful but not linked to the increase of motivation to learn mathematics. In fact, for one teacher, the use of digital tools as a learning tool create the opposite effect: it increases laziness in the logical reasoning approach and in the aptitude for memorisation.

Lithuania
The digital skills and practice of low-skilled adults is very different. In participants' opinions, this tool (e-Directory) could really help them in teaching maths.

CONCLUSIONS:

- The digital skills and practice of low-skilled adults is very different,
- the younger part of low-skilled adults is more skilled in using digital and mobile technologies and there is a good chance of success of the solution proposed by the M-Easy project, especially among young low-skilled adults (which incidentally have the biggest problems with mathematical skills),
- The participants also indicated that their adult learners are always curious to learn more, but some of them are hesitant at the beginning of something new,
- The "fear of the unknown" is always an obstacle to get over at the beginning and start taking small and steady steps in order to develop their math skills with the help of a facilitator would be the best way to move forward.

2. The main mathematical skills (abilities) which are important for low-skilled adults

The participants of the Focus Groups were asked to rate the suggested mathematical skills (abilities) which are important for low-skilled adults.

The Groups discussed and rated (1 – not important, 5 – very important) the importance of the suggested mathematical skills from the practical aspect (see the rating by partners and average by the whole partnership in Table 2). The list of skills has been sorted to define the most important mathematical skills to be developed within the project for low-skilled adults.

Table 2. Summarized list of mathematical skills selected and rated by the participants of the Focus Groups.

No.	Ability to:	Poland	Cyprus	Italy	Lithuania	Average
1	perform addition	5,00	5,00	5,00	5,00	5,00
2	perform subtraction	4,30	5,00	5,00	5,00	4,83
3	perform multiplication	4,10	5,00	5,00	5,00	4,78
4	recognise different geometrical shapes: rectangle, square, triangle, circle, pyramid, cuboid, cube, sphere	3,95	4,38	4,86	5,00	4,55
5	calculate percentage	2,90	4,46	5,00	5,00	4,34
6	perform division	2,20	5,00	5,00	5,00	4,30
7	calculate area of various shapes: triangle	4,10	3,46	4,57	5,00	4,28
8	calculate area of various shapes: rectangle, square	3,80	3,62	4,57	5,00	4,25
9	work with different measures (millimetres, centimetres, metres, inches, yards, etc,)	4,20	3,85	4,29	4,50	4,21
10	calculate perimeter of (most common) shapes: circle	3,80	3,38	4,43	5,00	4,15
11	operate with whole numbers	3,30	4,69	4,57	4,00	4,14
12	compare numbers (<,>)	3,00	4,62	4,43	4,50	4,14
13	mathematical logic (extrapolation of data from charts, work problems)	5,00	4,00	4,00	3,50	4,13
14	calculate area of various shapes: circle	3,30	3,46	4,43	5,00	4,05
15	understand analogue clock	2,50	4,54	4,00	5,00	4,01
16	operate with fractions	2,95	4,00	4,43	4,50	3,97
17	operate with decimal fractions	3,80	3,92	4,00	4,00	3,93
18	perform rounding	3,00	4,15	4,29	4,00	3,86
19	calculate square numbers	4,10	3,08	4,71	3,50	3,85
20	calculate volume (capacity) of	2,85	3,00	4,00	5,00	3,71

No.	Ability to:	Poland	Cyprus	Italy	Lithuania	Average
	different shapes: cuboid, cube					
21	calculate perimeter of most common shapes: rectangle, square, triangle	1,80	3,46	4,57	5,00	3,71
22	calculate volume (capacity) of different shapes: sphere	3,30	2,77	3,29	5,00	3,59
23	calculate volume (capacity) of different shapes: cylinder	2,95	2,62	2,82	5,00	3,35
24	calculate volume (capacity) of different shapes: pyramid	1,80	3,00	3,29	5,00	3,27
25	calculate square roots	2,75	2,85	3,86	3,00	3,12
26	proportions	3,00	3,00	4,14	2,00	3,04
27	understand different measuring systems (metric, imperial etc,)	1,80	3,00	3,71	3,00	2,88

CONCLUSIONS:

- The survey shows that the main mathematical skills beginning with **addition, subtraction** (pos. 1, 2) and ending with **understanding analogue clock** (pos. 15) could be of the most important ones for low-skilled adults. Thus, it is suggested to pay much attention to the first 15 skills (rated from 5 to 4,01) during the development of 20 planned training modules/apps on mobile device for the M-EASY training course.
- However, it is also suggested to leave all 27 math skills in the list for the partners' attention as the remaining 12 skills (starting with **operate with fractions** (pos. 16) could also be covered as additional skills in any training modules/apps on mobile device for the M-EASY training course or/and in the selected apps for the e-Directory.

3. Suggested life situations for developing APPs in order to improve mathematical skills

- The participants of the Focus groups have brainstormed problem-oriented real-life situations (tasks) related to mathematical skills, which could be developed as training modules/apps on mobile device for the M-EASY training course for adult training, for example, 1) Renovation of the house, 2) Managing the bank loan; 3) Managing the pocket money etc. The facilitators of the Focus groups have used the ideas about the problem-oriented situations defined in Annex 4.

  Focus Groups in Poland, Cyprus, Italy and Lithuania rated (1 – not important, 5 – very important) and discussed suggested life situations within the Group 11 and the result of rating is represented in Chart 1 and Table 3.

Chart 1. Life situations rated by importance for learning mathematics

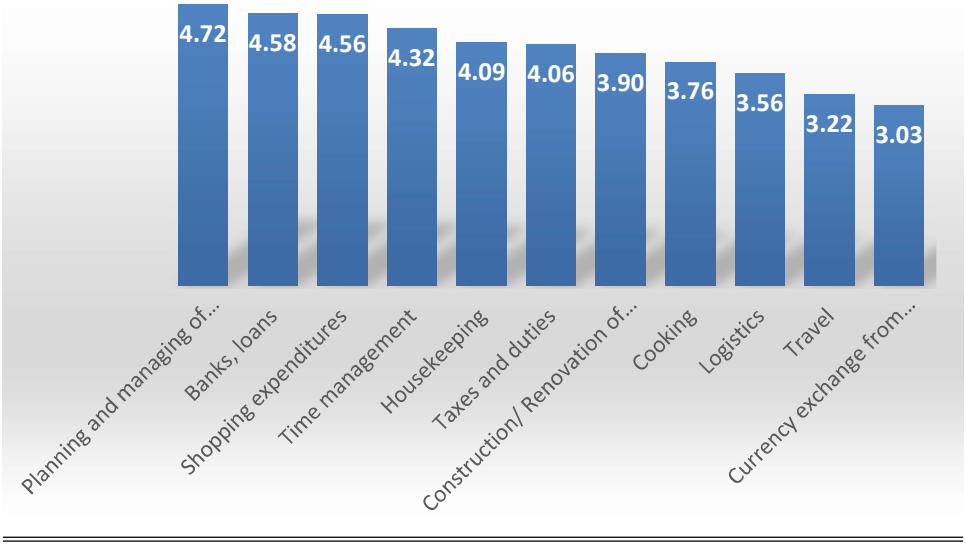


Table 3. Summarized and sorted by the Average rate list of suggested life situations for developing APPs in order to improve mathematical skills.

No.	Suggested life situation	Poland	Cyprus	Italy	Lithuania	Average rate
1	Planning and managing of personal budget	4,75	4,92	4,71	4,5	4,72
2	Banks, loans	5	4,75	4,57	4	4,58
3	Shopping expenditures	4,5	4,75	5	4	4,56
4	Time management	4,2	4,08	4	5	4,32
5	Housekeeping	3,75	4,17	4,43	4	4,09
6	Taxes and duties	2,8	4	4,43	5	4,06
7	Construction/ Renovation of your house	3,90	4,08	4,29	3,5	3,94
8	Cooking	4,55	3,42	3,57	3,50	3,76
9	Logistics	3	3,75	4,00	3,5	3,56
10	Travel	1	4,08	4,29	3,5	3,22
11	Currency exchange from national to the currency of another country	1	3,75	3,86	3,5	3,03

- The adult educators also discussed the possible scenarios for the training modules/apps on mobile device for the M-EASY training course and have suggested 23 scenarios, which are represented in Table 4.

Table 4. Short description of scenarios for APPs for selected life situations.

No.	Suggested life situation	Average rate	Short description of scenario for APPs
1	Planning and managing of personal budget	4,72	***Poland*** • The application allows you to calculate what part of the payment remains at our disposal after the introduction of all obligations and bills • An app that counts expenses and bills by category and shows percentage changes in these categories over time (month, year and more) ***Cyprus*** • Calculate your income and divide it according to your needs • Budget lines on monthly or annually expenses (rent, bills,) • An app that takes as input the money received and money spent. Like a banking system • Calculate how much you spend on bills and groceries
2	Banks, loans	4,58	***Poland***

			Application that gives the real value of the loan installment after entering all its costs ***Cyprus*** • Brief info on what is a loan, why we need it, how to get it, ... • Options for taking loans for housing etc. according to your budget • To calculate whether you can afford a loan based on your income and usual expenses • An app that takes as input loan, interest rates and payments. The user can see the status of the loan anytime • Calculate interest of heavy loan ***Lithuania*** *Calculation of the monthly loan repayment amount for the bank*
3	Shopping expenditures	4,56	***Poland*** • Creating a shopping list which will allow you to compare the prices of products from different stores. The list will be able to convert prices due to different units of weight (meat, meat, cheese, etc.) • Application converting the real value of the product after entering the percentage of the discount and the base price • Application showing how many products you need to buy so that the number of promotional points awarded for their purchase, has brought us some profit • ***Cyprus*** • Calculate how much material you have to buy and calculate your expenses • Budget management • To calculate monthly expenses from various shops (groceries, clothing, electrical devises, ...) • Calculate, with a specific budget for the week, how many things you can buy from the supermarket ***Italy*** • The people buying products in the supermarket which have a fixed price (like water, toilet paper, coffee, etc.) don't have problems in assessing their economic convenience. In case of those products with a variable price, such as fresh cheese, soap, biscuits, etc., sold in boxes, they have a price per kilo which is not always easy to understand. • It is suggested to develop an App that could help the learners to calculate economic convenience of the product with a price per kilo
4	Time management	4,32	***Poland*** • An application that allows you to count according to the category of how much time per day we spend on entertainment, work, shopping and other obligations. Self-introduction of these data will increase self-awareness and recollection ability to calculate your activity over time • An application that allows you to schedule important activities during specific hours during the day and which will block other apps that are responsible for entertainment through a smartphone at that time ***Cyprus*** • Tasks to fit in a schedule • Calendar app that can be connected to other family members ***Italy*** The app should allow to create and manage a timetable of the personal daily activities, paying attention to the following points: • the time needed for the activities: inserting the (personal) time for the usual activities (breakfast, shower, shampoo, washing machine, cleaning the bathroom, etc). • the app should help according to the physical environment, to the priorities

			(job, free time) and decide and remind the strategic/logic order in which it is suggested to run those activities. • Through alert and notifications (or bonus points), stimulating the achievement of the daily objectives
5	Housekeeping	4,09	***Poland*** an application that calculates how much time you spend on weekly cleaning of the apartment and sends you reminders that if you spend 15 minutes a day cleaning your surroundings, you will save time in the weekly settlement for a thorough cleaning ***Cyprus*** • A tory of a house owner trying to manage – can be combined with logistics • Be able to pay the statements at the end of the month • An app that keeps track when to do households and have reminders to buy cleaning products
6	Taxes and duties	4,06	***Poland*** • an application that allows you to calculate the amount of tax, after entering the category of income and income amount • application converting net prices into gross and vice versa • application converting the amount of credit and monthly instalment between different currencies, according to current exchange rates ***Cyprus*** • Including social security which confuses many people • For calculations of all taxes at personal level (for even food and drinks)
7	Construction/ Renovation of your house	3,94	***Lithuania*** People having low income usually renovate the house/apartments themselves. Thus, they have to calculate how many materials they need to buy namely, wallpapers, skirting board, tiles, paints, carpet, etc. It is suggested to develop the attractive App which will help the learner to learn and calculate the amount of materials needed for renovation.
8	Cooking	3,76	***Poland*** • an application that calculates how many glasses of water you should drink during the day (based on weight, height, sex and physical activity). With the possibility of showing historical data • application calculating the amount of carbohydrates in selected products or dishes ***Cyprus*** • Recipes – buy ingredients and compare prices • Different prices of supermarket for the ingredients • To measure quantities during the preparation of a meal and calculate the cost • Measure the ingredients of a recipe or double the recipe amounts ***Lithuania*** Tasks in recalculating ingredients for smaller or bigger final product than is in original recipe.
9	Logistics	3,56	***Poland*** • an application that converts the distance between distance measurement systems ***Cyprus*** • Just like time management map. Calendar with all the deadlines. Reminders when to start a trade ***Lithuania***

			TASK. You are willing to get to the city centre, but you are not sure which type of transport is better to take: a car or cab/taxi. Count which way is more beneficial for your finances and how much money you will save while choosing cheaper transportation.
10	Travel	3,22	***Cyprus*** • Create scenario where someone travels to another country • This could be easily linked with exchanges • Options for travelling with different means and prices • Calculations of all expenses for a trip in various countries
11	Currency exchange from national to the currency of another country	3,03	***Cyprus*** • Link to xe.com and sites such as this one and learn how to deal with currency exchange • Learn how to calculate different currencies and how to do division • To travel in various countries. An app connected to the internet, taking users location and display the rate of euros to the country's currency When traveling to a different country, count basic items' prices

CONCLUSIONS:

- The rating result showed that the highest rate and importance were obtained by the first 8 situations: ***Planning and managing of personal budget; Banks, loans; Shopping expenditure; Time management; Housekeeping; Taxes and duties; Construction/ Renovation of your house; Cooking.*** Thus, it is suggested to start developing of training modules/apps on mobile device for the M-EASY training course, using these situations.
- However, it is suggested to use all 11 problem-oriented real-life situations (tasks) related to mathematical skills for developing training modules/apps on mobile device for the M-EASY training course ***as Logistics, Travel*** *and* ***Currency exchange from national to the currency of another country*** have as well good ratings (3.56, 3.22 and 3.02 respectively) and have been mentioned by the participants of the Focus groups in their suggested scenarios.

VI. Overall Conclusions

- The results of the transnational report for O1-A1 „Needs Analysis for Upgrading Learners' Basic Mathematical Skills" accumulated necessary grounding for the development of the Training Course M-Easy based on training modules/apps on mobile device as the participants agreed that:

    - Assessment is a very important part of the learning process. It was also stressed that digital mathematics knowledge assessment tools for low-skilled adults are still not well developed and would be a good help for teachers and learners;

    - There is a huge gap for special programs and tools in teaching mathematics of low-skilled adults in the partnership countries Therefore, adult educators would willingly implement new ICT based methods in their classes, because special programs and tools would really help educators and low-skilled adults;

    - In participants' words, there is a lack of appropriate mobile Apps for learning/teaching adults mathematics, especially in all national languages of the partnership countries. New solutions and tools for learning / teaching mathematics using mobile Apps would be very welcome;

    - One very good and supportive tool could be an e-directory of existing mobile Apps dedicated to learning mathematics. . It can inspire learners with more ways of teaching and learning mathematics and provide adult educators with a great set of tools for teaching. The e-directory should contain descriptions of the main features of applications, a set of learning objectives and particular activities;

    - Developing mathematical skills of low-skilled adults with the help of a facilitator would be the best way to implement the new learning system based on Mobile Apps use.

- The survey shows that the main mathematical skills beginning with **addition, subtraction** (pos. 1, 2) and ending with **understanding analogue clock** (pos. 15) could be one of the most important ones for low-skilled adults. Thus, it is suggested to pay much attention to the first 15 skills (rated from 5 to 4,01) during the development the M-EASY training course.
- However, it is also suggested to leave all 27 math skills in the list for the partners' attention, as the other 12 skills (starting with **operate with fractions** (pos. 16) could be also covered by training as additional skills.
- The final list of selected and rated skills according to the suggestion of the project's evaluators is updated by grouping similar skills and simplifying skills'

names. The final list of mathematical skill to be used for the development of the project's outputs is presented as following:

No.	Ability to:
1	Perform addition
2	Perform subtraction
3	Perform multiplication
4	Perform division
5	Calculate percentage
6	Understand different measuring systems (metric, imperial, etc.)
7	Work with different measures (millimetres, centimetres, metres, inches, yards, etc.)
8	Operate with whole numbers
9	Recognise different geometrical shapes: rectangle, square, triangle, circle, pyramid, cuboid, cube, sphere
10	Calculate perimeter of rectangle, square, triangle
11	Calculate perimeter of circle
12	Calculate area of rectangle & squarecompare numbers (<,>)
13	Calculate area of triangle
14	Calculate area of circlecalculate area of various shapes: circle
15	Calculate volume of cuboid & cube
16	Calculate volume of cylinder
17	Calculate volume of sphere
18	Calculate volume of pyramid
19	Operate with fractions
20	Operate with decimal fractions
21	Perform rounding
22	Compare numbers (<,>)
23	Understand analogue clock
24	Understand proportions
25	Calculate square numbers
26	Calculate square roots
27	Extrapolation of data from charts, statistics

- It is suggested to start developing of training modules/apps for the M-EASY training course using first 8 highly-rated situations: *Planning and managing of personal budget, Banks, Loans and Credits, Shopping expenditures, Time management, Housekeeping, Taxes and duties, Construction/ Renovation of your house, Cooking*.
- However, it is also suggested to use all 11 problem-oriented real-life situations (tasks) during the development process ***as Travel** and **Currency exchange from national to the currency of another country*** have a good rating as well and have been mentioned by the participants of the Focus groups in their suggested scenarios.

- Suggested 23 scenario with life-oriented situations have created a basis and a good starting position for developing of training modules/apps on mobile device for the M-EASY training course.

VII. References

1. European Commission, Key competences for Lifelong Learning, European Reference Framework. Luxembourg: Office for Official Publications of the European Communities, 2007.
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VIII. Annexes for the summary report:

1) ANNEX 1. Template Agenda for the Focus group meetings
2) ANNEX 2. QUESTIONS for DISCUSSION within the Focus Group
3) ANNEX 3. List of suggested mathematical skills
4) ANNEX 4. List of suggested life situations for developing APPs in order to improve mathematical skills.

ANNEX 1. A G E N D A (template)

Focus group meeting with 8 - 10 adult educators, social workers working with the low – skilled adults, including migrants, refugees and asylum seekers

Date: [date of the meeting]
Place: [place of the meeting]
Organized by: [partner organization]

Expected duration of the focus group meeting is approximately 3 hours.

10:00	Welcome and Agenda
10:10	Introduction of the participants of focus group using Ice-breaking game
10:30	Presentation of the European project: M-Easy: Improving the Integration of low-Skilled Adults Through Developing Mathematical Skills and Community Support.
10:50	Brainstorming about the situation in partners countries on existing training for low skilled adults on developing mathematical skills using questionnaire (see Annex 3)
11:30	Coffee break
11:45	Discussion on the scope of the most necessary mathematical skills using the list of suggested mathematical skills in Annex 4.
12:20	Brainstorming and creating 2-3 scenarios of real life situations for developing APPs in order to improve mathematical skills (use Annex 5).
13:00	Concluding of the meeting, information on further project activities

ANNEX 2. QUESTIONS for DISCUSSION within the Focus Group.

In the National report it is suggested to summarise the answers for each set of questions in 4-5 lines.

1. What is your experience in training of the low-skills adults? Could you shortly define the term 'low-skilled'?

2. Could you shortly describe the level of the mathematical skills of low-skilled adults in your country, taking into consideration as well the level of math skills of migrant, refugees and asylum seekers? Do you have an experience in analysing the level of maths skills of your adult learners using special assessment tools? Or is your opinion based on your day-to-day educational experience?

3. Do you have experience in training / teaching mathematics? Do you think that special training programs are **needed** to train maths skills of low-skilled adults? How can you define the situation in your country/region/town with regard to training in mathematics for low-skilled adults? Do you think enough attention is given to low-skilled persons' training/teaching in mathematics? Do you **have/use a special** training program for low-skilled? Are these courses freely-accessible (free of charge or/and developed as open educational resource?)

4. What in your opinion are the main obstacles to train low-skilled adults in mathematics: lack of motivation, lack of training programs and innovative tools for the training, lack of qualified tutors? Other obstacles?

5. Do you already use mobile Apps in learning or teaching mathematics? If **Yes,** please name some of the APPs you use. If **NO**, and you still do not use the APPs for training, what in your opinion are the main obstacles to use mobile Apps in learning / teaching mathematics, (lack of equipment, lack of skills or proper tools – mobile Apps, other)?

6. Within M-Easy project we plan to collect an e-Directory of already existing mobile Apps dedicated to learn mathematics. Do you think, this tool (e-Directory) can help to adult educators to start teaching maths using APPs?

7. What do you know about the digital skills and practice of the low-skilled adults you teach/train? Do you think that innovative digital era tools like mobile Apps oriented in solving a range of problems in everyday situations could increase motivation of low-skilled adults to learn and improve their mathematical skills?

ANNEX 3. List of suggested mathematical skills

Select main mathematical skills (abilities), which are important for low-skilled adults and rate them from 1 to 5 (1 - not important, 5 - very important):

	Ability to:	Rate from 1 to 5	Comments / notes
1	Perform subtraction		
2	Perform multiplication		
3	Perform division		
4	Calculate percentage		
5	Understand different measuring systems (metric, imperial, etc.)		
6	Work with different measures (millimetres, centimetres, metres, inches, yards, etc,)		
7	Operate with whole numbers		
8	Recognise different geometrical shapes: rectangle, square, triangle, circle, pyramid, cuboid, cube, sphere		
9	Calculate perimeter of rectangle, square, triangle		
10	Calculate perimeter of circle		
11	Calculate area of rectangle & square		
12	Calculate area of triangle		
13	Calculate area of circle		
14	Calculate volume of cuboid & cube		
15	Calculate volume of cylinder		
16	Calculate volume of sphere		
17	Calculate volume of pyramid		
18	Operate with fractions		
19	Operate with decimal fractions		
20	Perform rounding		
21	Compare numbers (<,>)		
22	Understand analogue clock		
23	Calculate square numbers		
24	Calculate square roots		
	OTHER (add if necessary)		
	OTHER (add if necessary)		

ANNEX 4. List of suggested life situations for developing APPs in order to improve mathematical skills.

Tasks for the Focus groups:

1. Check the title of the situations and correct if necessary or suggest more situations.
2. Rate the most important situations using range from 1 to 5 (1 - not important, 5 - very important).
3. Brainstorm and create 2-3 scenarios for future APPs, which could be developed within the project.

	Life situation	**Rate (1-5)**	**Short description of scenario for APPs**
1	Construction/ Renovation of your house		*For example:* The people having low income usually renovate the house/apartments themselves. Thus, they have to calculate, how much materials they need to buy, namely: wallpapers, skirting board, tiles, paints, carpet, etc. It is suggested to develop the attractive App, which will help the learner to learn and calculate the amount of materials, needed for renovation.
2	Shopping expenditures		
3	Banks, loans		
4	Currency exchange from national to the currency of another country		
5	Planning and managing of personal budget		
6	Time management		
7	Taxes and duties		
8	Cooking		
9	Logistics		
10	Housekeeping		
11	Travel		
	Other situation, if needed		
	Other situation, if needed		