NEED, SIGNIFICANCE AND RELEVANCE OF EDUCATIONAL TECHNOLOGY IN OUR WORLD

Toon Abcouwer
abcouwer@uva.nl

Emőke Takács
ERI Hungary - Nonprofit Kft, t.emoke@eri.net.in

Judit Dömölki
ERI Hungary - Nonprofit Kft, d.judit@eri.net.in

Mate Beres
ERI Hungary – European Research Institute, mate.beres93@gmail.com

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NEED, SIGNIFICANCE AND RELEVANCE OF EDUCATIONAL TECHNOLOGY IN OUR WORLD

Toon Abcouwer
University of Amsterdam
abcouwer@uva.nl

Emőke Takács
ERI Hungary – European Research Institute
t.emoke@eri.net.in

Judit Dömölki
ERI Hungary – European Research Institute
d.judit@eri.net.in

Mate Beres
ERI Hungary – European Research Institute
mate.beres93@gmail.com

Abstract:
The complexity and speed of business, societal and technological changes make it difficult for schools to educate students to be effective in their adulthood. A survey of top-managers confirms that new employees often need considerable assistance to develop the skills and competences, such as problem-solving and decision making, needed for success. We propose a new, collaborative eLearning technology that will (a) assist organizations in this development process, and (b) allow them better to solve the myriad of organizational problems they encounter. The technology draws on resources both within and outside these organizations.

Keywords: eLearning, learning objectives in a changing society,

I. INTRODUCTION

In contemporary society there is a growing need for highly qualified, independent thinking, proactive employees. Among successful managers, there is a high degree of consensus of what they expect from young employees. The complex demands of society, as well as uncertainty about solutions to current days’ challenges show a growing concern about how these employees are able to deal with organizational problems. Formal education is often blamed for that situation. Inadequate knowledge and skills and, sometimes the lack of inspiration make some people have severe doubt about the future.

Dissatisfaction with the present education system arises from a perceived lack of innovation in teaching methods, accompanied by inappropriate technologies and – more importantly - the lack of trust. There is hardly any doubt that the success of students depends highly on the guidance and opportunities offered by their parents. New requirements are therefore, imposed on education which induce a re-focus on the role of educational institutions within the lifelong learning processes and also the role of modern eLearning environments.

"I have no kids, but I'm not satisfied with our education system at all. My parents are teachers and we have a lot of arguments about this. In my opinion education is too conservative, completely outdated, it limits capabilities instead of developing them. I've been working as an economist for 12 years, and I have never used my grammar school mathematics knowledge, not even at the university. But I benefited a lot more from logical reasoning, presentation skills, and assertiveness. It would be much better to educate children with a healthy spirit, with less lexical knowledge, but with greater creativity, instead of trying to push the Prussian method through. For everything else there is Wikipedia and Excel." Interviewee 1
New learning approaches are being introduced and new eLearning environments developed. But how relevant are these approaches in current practice? Do they really help young people prepare for their unknown future and develop the capabilities they need, to deal with the challenges they will face in their professional careers?

To give an answer to these questions we need to gain a better insight in the requirements as they are raised by people working. In the first phase of our research, we therefore interviewed a number of employers and managers, trying to get an insight in their view on the current situation. In a second phase of the research, we considered how to facilitate a more proper educational process with modern eLearning environments.

II. RESEARCH APPROACH

In order to match the need of employers towards usable knowledge of entrants in the labor market, we started our study by approaching top-managers from mid/large organizations with open questions, in a semi-structured interview, we obtained their opinion on current education, and their views on future developments that they would welcome. 25 managers of different organizations were interviewed from 9 different sectors of the economy. We have searched for answers to identify the type of organization, whether the managers deal with well-defined problems or ill-defined challenges. We have tried to discover how managers rely on the knowledge they gained in school and their willingness to cooperate with others to solve problems. Exploring the mindset of managers, we raised questions on the importance of training generalists or specialists, and making decisions. We have gained information about the role of education, as a way of building abilities for young people to be successful in adult life and able to deal with current and future problems. The results of the interviews were analyzed focusing on formulating requirements regarding the role of eLearning in the educational processes in society.

III. THE RESULTS

We interviewed experienced higher to top level managers from a broad range of organizations (see appendix 1) in Hungary with representative inputs for understanding the need of the market towards education. It is our firm belief that the outcomes of our research can be easily transferred to other countries and underpins the need, significance and relevance of educational technology in our world.

The answers of the interviews showed that a knowledge missing in formation is that education does not prepare people for dealing with problems. We identify two types of problems managers focus on (see Figure 1) a) well-defined, and b) ill-defined (Pel, 2018). Well-structured problems have a well-defined initial state (what is known), a well-defined goal state (the solution is reachable) and a known procedure for solving the problem (solution process) (Jonassen, 1997, 2000; Simon, 1973). Ill-defined challenges are problems for which there are conflicting assumptions, evidence and opinions which may lead to different solutions. (Jonassen, 1997, 2000; Kitchner, 1983) They may have a number of different solutions or no solution at all. There is no guaranteed procedure to reach such solution.

The outcomes of the interviews show a need towards education:

- **Working on well-defined or ill-defined problems**
The research shows (see Figure 2) that more than half of the interviewed managers agree that the challenges they most often face are hard to define and difficult to foresee, that is, ill-defined problems. In general, they mention that well-defined problems can be delegated easier, faster, so top managers can devote more of their precious time to ill-defined challenges. Answers proved, that managers indicated that they do not feel completely prepared themselves to deal with ill-defined problems.

A positive aspect brought in by the managers is that dealing with well-defined challenges often result in effective solutions, which are therefore lessons learned. (Tate, 2018)

Managers found ill-defined problems always to be more challenging. Even successful and experienced, top managers admitted being anxious when they face these unforeseen problems. Many times, they turn to known and justified methods like Risk Matrix Methodology and try to convert the ill-defined problem into a well-defined one or try to get to a different position before the challenge appears they predict. But it does not always work: sometimes ill-defined problems cannot be converted into well-defined structures. We find that education has a crucial role to deal with developing this knowledge and skill.

- **Practical experiences with ill-defined problems.**

Some managers emphasize that, when dealing with ill-defined problems, they listen to their “intuitions”. Their experiences made them identify two different sources of learning: learning from the experiences of the past; and learning from the future as it emerges. Learning from the past is well known to everyone and well developed in education: underlying our major learning methodologies, best practices, and approaches to learning. The second type (in some literature “Presencing”) is about better sensing and connecting to a future possibility that is seeking to emerge by sensing, tuning in, and acting from predicting future results. Managers seem to use unconsciously both types, in different proportions, to solve ill-defined problems. When managers tend to rely on their intuitions they are often not aware of going through the process of theory U. According to Scharmer (2007) we live in an era when new form of presence and power is rising that starts to grow spontaneously from and through small groups and networks of people. The importance of cooperation is obvious. IT / IS and education may support developing this skill.

- **Co-operation with others within and/or outside the organization.**

It is common practice for managers to involve third parties in the decision-making process. Many of those people are already in the organization, but, often, they are from outside the organization. However, in a large multinational enterprise, it is difficult to get input from all the people in the organization, who could help provide an effective solution. Cooperation also depends on the nature of the challenge, but if it is relevant, the interviewed managers select a team they trust, and then follow the course of problem-solving together. On certain problems managers prefer to decide on their own, because the responsibility lies on them or because they feel they are the ones with experience and willingness to face the challenge. Communication with stakeholders and finding common solutions are necessary steps to deal with the ill-defined challenges. In such setting Ernő Rubik, the inventor of Rubik cube says, „There is always a solution, what’s more, not necessarily only one.” Finding solutions with

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1 Presencing (Scharmer, 2007) is a blending of the words “presence” and “sensing.” It means to sense, tune in, and act from one’s highest future potential—the future that depends on us to bring it into being.
different views and perspectives from our teams, or from anywhere in the world can support the problem-solving process. Online networks are great tools for this issue.

• The mindset of the manager

We were curious which mindset is more valuable for a manager; a mindset based on a general, broad-based background, or a specialized one in a certain field, in order to discover what education should focus on. The answer appears to be based on the nature of the problem. However, generalists will often seek the opinions of specialists, so that the generalist manager can gain a better understanding on the issue. Another approach is to look for solutions close to the root of the problem. Business-like thinking, focus and empathy are also key factors.

When a solution to a problem seems to be found, the manager has to decide whether the solution is satisfactory or not. Testing the potential effectiveness of a solution is not always an easy task, so often externals have to be involved and decisions can only be made after further consultations. ‘If we knew right away that the decision was right, we would always make good decisions, wouldn’t we? Applying KPI-s when they are applicable is always a good idea, but their point is that the focus should be on learning not rating. During the evaluation, minor corrections can still be made. An interesting point of view is, that the decision-making team has to adopt the solution as its own, and not as the solution of one of the members of the team. The solution is always based on a consensus and it can only be decided afterwards whether it was really the right one. It is not important to make the perfect decision all the time, but to be able to correct it in time. There are cases when there are contradictory positions. In that case, the role of the manager comes to the fore, where one can decide based on the resource, added value, time and the organizational effects. Considering the consequences, the quality of the change, and evaluate the decision based on these, seem to be steps to be taken by the manager.

Last but not least, the interviews showed that it is important to learn from the consequences of previous solutions, and that is the point when experience plays a particular role. A characteristic of ill-defined problems is that they are not necessarily things that occurred earlier. As an interviewee formulated it “Next time a similar challenge is no longer a challenge but a routine task.” Success is never final, so we always have to be prepared for new challenges and we have to do it in a way that we do not only consider these situations as fights or struggles. The managers state, that nothing contributes to one’s development as much as facing difficulties – even failures -they can explore them afterwards and make decisions accordingly. By learning from our experiences, we can make the right decisions with a lower risk of failure. The team experience also builds an environment of trust.

Shaping our attitude to problems, we should not start our sentences saying that “Oh the problem is...” but "How could we...". If this mindset is rooted in someone, it can change the thinking on problems towards solutions and affect our private lives. Solving a problem well, you innovate and create value. Obviously, managers should be trained to solve difficult-to-define challenges. Education should teach us to get answers for problems. Well-trained professionals can work almost automatically, people with improvisation skills can realize the next steps to be taken easier. Our respondents believe more in coaching and mentoring than formal education, “trust, delegation, failure and quick learning”. Education is very important not only for acquiring routine, but also for becoming more self-confident. Someone without self-confidence, cannot make decisions, so is not fitted for a manager position.

• The view on education as a way of building abilities to deal with future challenges

In general, our interviewees have serious doubt about the role current formal education plays in current society. The managers emphasized that young employees must rely heavily on the education, skills and techniques they learn within the organization itself. Internal knowledge sharing often happens in an informal way. We realize that many large employers have a say to university curricula. The well-defined lexical knowledge has lost its relevance in our times,

“A wise man learns from other people’s misfortunes, but most people only from their own failures.”

Interviewee 5
when knowledge is only “one click” away from us. In the world after schooling, young people need to have problem-solving capability in an unpredictable and changing environment. The role of education seems relatively low compared to any kind of media or telecommunication sources. Another main source of knowledge is practice and exchange of information. Sharing knowledge is a key to gaining appropriate skills and competences and preserving this state-of-the-art “position” in the long run, so, a digital collaborative platform seems to be an obvious solution. It could facilitate learning, and the exchange and development of knowledge. We can assure that the learning process will be as SMART as it can be. The structure of the platform is based on the identification of the needs of our society. The main procedure here is that we need to find appropriate knowledge wherever in the world, facilitate communication between knowledge sources to enable the co-creation of new solutions for societal problems. Dissatisfaction with the quality of formal education in our interviews give a clear indication that new developments in the educational field are a growing necessity.

This analysis helped us to better understand the opinion of the interviewees and the impacts on the role of education and especially on the position eLearning fulfills in that respect, furthermore it forms a basis to propose a new, collaborative eLearning technology that can assist organizations and educational institutions as well.

In the next paragraph we will elaborate the link to relevant theoretical insights.

### IV. LINK TO THEORY

Successful managers solve problems within an organization by determining the root of the problem, and its importance, and then consider how it can be addressed from the point of view of the different parties affected. Based on the information they gather, they determine possible solutions and chose the best alternative, considering such factors as costs, benefits, risks, etc.

Some organizations have defined working techniques for solving the different types of problems that provide clear guidance on how to resolve each problem type. If a crisis occurs, their crisis management policy takes effect, with clearly defined mandatory staffing and action plan. This also means that the process can be backed up by technology, and that people can be trained in applying these technological solutions. However, we cannot fail to consider the personal experience, intuitions and creativity of managers.

It is clear within this context that managers tend to look at reality as being as close as possible to well-defined problems (Kaleido, 2010; Zimmerman & Schulich, 2001). Predictions, the need for control and the awareness of power relations and playing political games come to the fore as reasons for that main tendency (see Figure 3). In a world where the overall movement is towards a higher degree of uncertainty in the dynamic developments, it is obvious that developing skills and competences that support handling ill-defined challenges is crucial. In our analysis of the answers we try to build a view on education and the role eLearning.

We already referred to some theories. Knowing that the field of study is broad, covering all relevant theoretical insights is impossible. We briefly describe theories crucial for our research.
Theory U (Scharmer, 2007)
Cooperation is crucial when an organization faces ill-defined problems, existing knowledge is short in finding solutions. Theory U refers to different co-activities, where an innovation ecosystem helps to co-create solutions. The basic idea is that initiation leads to awareness where new insights emerge for dealing with actual challenges.

The journey in theory U consists 7 steps (see figure 4) to open one's mind (openness for change) heart (awareness of new insights) and will (acting) and help to develop extra skills for solving unclear challenges:

1. **Downloading**: When we feel that there must be something else then what we already have done and experienced, but we not yet know what “it” is.

2. **Seeing**: When we think deeper, we see things more clearly.

3. **Sensing**: When our awareness deepens, and we start feeling what “it” is.

4. **Presencing**: When the moment of awareness continues to deepen as we let go of the old and let rise what wants to emerge. We sense and see both the current reality and the future.

5. **Crystallizing** vision and intention: When the awareness continues to manifest as we envision, and let come the future that wants to emerge. The vision and intention begin crystallizing.

6. **Prototyping** living microcosms: When the awareness continues to manifest as we enact prototypes in order to explore the future by doing.

7. **Performing** and embodying the new: When the awareness continues to manifest as we embody the new practices and infrastructures.

All respondents find that trust is one of the key prerequisites in addressing, preparing for and eventually being able to solve ill-defined problems.

This insight also leads to a better understanding what requirements there are for eLearning.

Management as ART, CRAFT or SCIENCE (Mintzberg, 2009)
In management theories it is the manager’s role to identify the problem, calculate which pre-known solutions are applicable and run the change process in an effective and efficient manner. The way of organizing the eLearning environments are similar. For well-defined problems it might work well, but the interviews show that a growing attention is needed for solving ill-defined challenges, where this does not fit well.

As seen in Figure 5, Mintzberg (2009) introduced the difference between management as Art, Craft or Science, which is relevant in real life, where ‘Thinking first before doing’ does not work in disruptive change and different requirements regarding eLearning occurs.
Seeing first (art of recognizing alternatives) or doing first (Craft deal with the problems with inner experiences) are not based on a thorough defined set of knowledge and skills, but on abilities to recognize new insights, combine any existing knowledge, co-create solutions where your own knowledge and skills fall short. Generalists of a specialists own these abilities?

**Specialist or generalist (Abcouwer, Takács, & Dömölki, 2017)**

It is an interesting question, whether ill-defined challenges call for generalists or specialists. Our respondents considered themselves generalists without any exception and stated that they involve specialists of different relevant fields in their decision-making processes. They consult with experts, exchange thoughts, rely not only on their knowledge but on their opinion to ensure the necessary insight.

The all-knowing generalist

![Diagram of Generalists](image1)

**Figure 6: Generalists**

Higher and adult education tends to develop specialized experts regardless the market demands. The gap between specialists is growing. (Figure 6 and 7)

The all-knowing generalist doesn’t work any longer

![Diagram showing unavailable and available knowledge](image2)

**Figure 7: The depth of understanding**

As already outlined, the social need for knowledge and skills develops rapidly. For a long time, we thought it was the sole responsibility of the traditional education to deliver the necessary knowledge and skills. In current practice it became clear that knowledge meeting these requirements is covered by knowledge co-creators both within and outside the scientific world. Through this route, both the breadth of knowledge and the necessary depth could be taken care of.

However, dynamics in the development of needs for knowledge and skills offered by modern science can be characterized in parallel with its widening of requirements but also offering knowledge and skills within modern society outside the scientific world.

In order to meet this, science is being used for further specialization. However, specialization is characterized by a deepening of the level of knowledge and at the same time a narrowing of the research area. Related to this development hardly any eLearning environment facilitates the multidisciplinary needs of modern society.

In order to provide this knowledge through specialization, there is a risk that an increasing number of specialists need to be involved in meeting the knowledge needs (Figure 8 and 9). In order to find
these specialists, we need to rely on broader resources. From an educational perspective, all these sources cannot be automatically found in traditional research institutions.

Finding new sources of knowledge and integrating into existing worldviews are tasks to be facilitated by modern eLearning environments. Unfortunately, commonly used environments do not facilitate it at all. New requirements are needed to be formulated.

![The deep specialist approach](image)

Figure 9 The depth of understanding the world

**V. IMPACT ON E-LEARNING TECHNOLOGY: THE I-SOLUTION APPROACH**

Ill-defined problem situations require a growing number of specialists, and it influences the need for synchronization of the process of change, which management normally intends to stay in control of. Each specialization belongs to a political area, where high-level specialists keep the control over the change processes. These may lead to problems, because general management often base their insights on experiences of the past, while the change processes should be based on expectations for the future. The insights on that developments are often under-developed. The management’s need for experimenting and empowering to be able to deal with the unknown future(s) is in high contradiction with the tendency to strive for certainty in its behavior.

In theory U the tendency is to reduce change processes to observing (downloading) and implementing existing worldviews. Diving deeper into the newly developed realities requires opening your mind, heart and will. This necessity is in line with the approach to resilience (Ensor, 2011; Gunderson, Allen, & Holling, 2009; Holling & Gunderson, 2002). Based on the findings of our research, requirements for modern eLearning environments to fulfil the role in a modern societal setting can be summarized in four main categories. We call this environment the iSolution environment (Abcouwer & Takács, 2018; Abcouwer et al., 2017; Trago & Mulder, 2017).

The implementation for the recommended technology of iSolution consists the followings (Figure 10):

1. **KSB** - Building up the iSolution platform knowledge base with youth, citizens, job centers, SMEs, public bodies, NGOs, including their priorities and needs, legal, regional and cultural information and information to support start-ups; self-employed; entrepreneurs, based on best practices throughout the world.

2. **CI** - Facilitating an innovative communication infrastructure, study and internship opportunities, Marketing and demonstration

![The iSolution](image)

Figure 10 The iSolution
3. MI - Providing opportunities to enhance citizens’ marketability via tools and resources traditional and self-education opportunities, short courses, workshops, public events based on co-creating digital innovation methodologies

4. CC - Engaging in active dialogue with society to identify future needs and facilitate co-creation to develop new insights for unknown future requirements.

Implementing our approach to learning with the accompanying platform facilities we assure sustainability in the long run fully supporting any educational settings. As a result, we strive for:

- Building skills to enable our people to adapt to our changing world (KSB, MI)
- Promoting sustainable and quality employment by empowering people (KSB, CI, MI)
- Strengthening transnational cooperation to address challenges (CI, CC)
- Reducing economic and social disparities by building more inclusive societies, giving chances to all, including less privileged, migrants, minorities, poor, and those with disabilities (KSB, MI, CC)
- Reaching gender balance and equality in learning and working by an open, inclusive, efficient education program (MI, CC)
- Reaching added value by Open Innovation solutions, consistent with sustainable development, long-term economic growth, social cohesion (CC)

One of our intentions with the study was to explore how education can support staff and leaders to be able to solve ill-defined challenges better. We realized that there is need, significance and relevance of modern educational technology in our world.

How can this be provided within an organization?

Of course, most companies look for possibilities from soft skills trainings through lean and agile methodologies to studying, adapting, personal mentoring and coaching methods. An interesting approach is for example, to shape attitudes to problems, based on the Google Ventures Design Sprint methodology (Banfield, Lombardo, & Wax, 2015). Regular and systematic management trainings (individually and in groups) and internal knowledge sharing are also valuable methods. Education and mentoring are crucial parts of the role of professional managers. Learning by doing can be applied many times successfully, so colleagues are encouraged to experiment, try, make mistakes. The worst thing is not to move.

As the answers prove, managers can be and should be trained to solve difficult-to-define challenges. The decision process can be taught, but making good choices is art and craft, and not pure science. This attitude can be taught, especially at an early age. As we are all born with creativity, an effective education system should strengthen these skills and make them used to get answers and for solving problems. This support is very important; improvisation skills will automatically envisage what should be the next steps. Other important terms are empowerment, trust, handling errors. Coaching should be part of the organizational culture, as it complements the means of the formal education system.

At this point of the study, we raised the question, whether focusing on the role of information proves that intelligent and cooperation-based educational technology contribute to

- Acquiring competent and practical knowledge
Supporting the problem-solving practice of ill-defined challenges.

The explosion in information technology obviously requires keeping pace with technological change. There is almost no question that cannot be answered fully or partly with the help of the Internet. Of course, the decision is in our hands, but with accurate information and creativity, it is possible to significantly reduce the risk of choosing an inappropriate solution.

Top managers listed quite a few tools that support them in solving ill-defined problems, including lean and agile methods, the canonization of self-synthesized practices in company knowledge, scenario construction, scoring the worst options, data-based decision preparation, consultation and enhancing involvement, meditation, special statistical calculations. But even at this level, people are uncertain where to get support for solving unforeseen challenges and how to get prepared. For this reason, education should more focus on improving the skills and competences that enable solving challenges, beside transferring knowledge on already existing solutions.

Our respondents agreed that today the knowledge transferred by schools still more focus on information, and lexical knowledge and not how they can be applied. In our view, in the school of the future:

- Standard content and requirement will be less important
- Structured content will grow (based on the choice of the individuals) enabling students to build their customized educational paths
- eLearning systems provide feedback on the progress made, but instead of comparing it, enhancing personal developments
- Focus more on acquiring skills in thinking and problem solving
- Bring more opportunities to unfold creativity
- Develop abilities to recognize coherences.

The iSolution we are developing tries to cover well these requirements. The main outline of the requirements for a new eLearning system were described but will have to be further elaborated.

The iSolution method was tested in a workshop at the Dutch Ministry of Defense of the Netherlands. A diverse group of experts has practiced the approach to verify and gather available knowledge and co-create solutions for current problems. Participants identified urgent topics and their impacts on the organization and worked out solutions in three different groups. The approach for problem-solving differed from group to group, depending on the different knowledges of experts. Each groups’ work and their conclusions were presented to the broader audience, and the other groups of experts could add and ameliorate the suggested solutions. The result was fascinating: new and innovative suggestions popped up during the team-work, involvement, dedication and attitude changed in one day of practice. The experiment proved the potential of the iSolution methodology in a real-life context, and participants left with a conclusion that such co-work would be necessary on a regular basis.

The knowledge and skills base (KSB) is essential in our world to integrate the latest knowledges available both in education and in the working life of organizations. The communication infrastructure (CI) facilitates the communication that is required for learning. The marketability tool (MI) initiates the involvement of the people, while the co-creation facilities can ensure a platform to develop new ideas and life-long learning in daily work.

“In Japan, a single person can try her or himself out in ten different professions before she/he finds the right one. She/he has this opportunity, because the right abilities were developed at school. Those, who are strong in mathematics must open up areas in their minds to quickly master the easy-to-handle disciplines in line with her/his abilities. I would surely reduce the ratio of dubbed films on television and cinemas, in order to improve language competences.”

Interviewee 4
VI. CONCLUSIONS

We have realized that there is need, significance and relevance of educational technology in our world to meet what most managers claimed for treating problems as challenges, an attitude we observed on studying the questionnaires. "Decision-making is not science, but art" says one of our interviewees. This is exactly the thread we would highly encourage to emphasize in educational curricula.

The above sentence chimes with Mintzberg’s argument about management: “it’s the place where art, craft and science meet. There’s an artistic element to management and a craft element – which I think is the most important, based on experience. And there’s a science side, which is working systematically by analysis within the management process.” (Mintzberg: Management 2009) Saying this, he refers to the fact that different techniques get integrated into corporate behavior without being acknowledged, they gradually infiltrate into analytical processes and this way they simply become part of the accepted way of doing things.

The interviews showed, that job market demands call for a solution bridging the gap between generalist and specialists, fresh graduates and experts with practical experience, between those, who own the knowledge and those who wish to own it, so we came to the idea that a collaboration platform could work as a solution. That’s how the iSolution platform concept started to develop. As a state-of-the-art digital tool, it could be very popular, especially among young people, so it would be relatively easy to bring them round. Another advantage is, that it will not want to compete with any other form of education. It can serve as an addition, integrated in formal, non-formal education, company-level training or can even be used by individuals. It will help them explore available public knowledge and encourage others to participate in the co-creation process and can contribute to co-designing and implementing science-related policies. Based on the knowledge gathered, a scientific agenda can be set up that supports the process of linking potential actions. It can also act as a catalyst to develop scientific skills and competences, and as an accelerator for informal and formal science education of young people and adults. Other important aspects today are social inclusion and scientific literacy; the iSolution platform can be a tool to both: it can raise the rate of scientific literacy of citizens, and promote social inclusion and employability, foster excellence by ensuring gender equality and mainstreaming in research. Raising efficiency and quality of key research infrastructures in education with and for the society will open the labor market for researchers, knowledge development and careers, while establishing channels to keep up the learning process even after someone has finished his/her studies.

VII. APPENDIX 1

Our respondents come from the following organizations (Figure 11):

The: Google, Alteo (One of the largest Hungarian company on the field of energetics, specialized in renewable energy sources), LEGO, Heineken, Greenpeace, British American Tobacco, Hemingway Group (Group of George Hemingway, American businessman of Hungarian origin, former owner of the KFC and Pizza Hut licenses, and one of the oldest football teams in Budapest (Honvéd), where Ferenc Puskás used to play.), Generali, SPAR, Invitel, Royal Canin, Wawemaker (Largest media agency of the region.), ELTE (One of the most prestigious university of science in Hungary.), Honvéd Hospital (One of the biggest hospitals in Budapest.), Nemzeti Kulturális Alap (National Cultural Fund, responsible for distributing funds in Hungary.), Felház (Cristian movement, founded by university students. They organize events with the objective of bringing religion into the lives of youngsters. The son of the Hungarian prime minister is among the founders.), Hell Energy (The
4th largest company of the energy sector in the world, founded by Hungarians. Recently they prepared an advertisement with Bruce Willis.), Bátor Tábor, (Brave Camp, nonprofit organization, organizing camps for kids with disadvantages. Its present managing director used to be the marketing manager of Google.), Magneoton Music Group (Largest music publisher of Hungary, working with the most popular and known music stars.), Emerald PR Agency (Largest PR agency of Hungary.), Virgo Group, ServoMovement (Hungarian technological company, owner of the first Hungarian social media platform „iWIW”.), Observer (Largest media observer company in Hungary.), Teqball, Docler Holding (Hungarian company working on new invention. Subsidiary of Docler Holding, which belongs to one of the richest man of Hungary), Wessling laboratories.

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