"LEARNING BEFORE EDUCATION" – TEACHING SKILLS FOR LIFE: PAST AND PRESENT PRACTICE

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Abstract. A 2012 survey revealed that parents who belong to the economic elite in contemporary Serbian society lost confidence in public education. In order to find a way to improve features of formal education, we created and then analyzed practical classes of non-formal character in archaeology studies at the University of Belgrade. Students learn the skill of making stone tools, reproducing activities that had taken place in both informal and non-formal environments in prehistoric communities of hunters and gatherers. Qualitative research shows students' positive attitudes towards such activities of acquiring skills that accompany theoretical classical lectures. In other words, ways of learning before (institutional) education can help overcome obstacles in formal learning. For the first time, an assessment of the archaeology lessons supports strengthening non-formal learning within public higher education.

Keywords: non-formal learning, higher education, skill, archaeology, stone artefacts

Introduction

The process of mandatory primary education in contemporary society aims, among other things, to empower and prepare individuals from all social groups for choices that will allow social and economic autonomy. There are also opportunities for additional learning and skills acquisition, enabling children and young people to express their talents and interests.

However, after completing a 2012 survey, we observed a decline in the valuation of institutional education in contemporary Serbian society (Mitrović, 2015). Parents who belong to the economic elite, having lost confidence in public education, pay little attention to the technical knowledge and skills necessary for survival in the modern world. They turn to private lessons and other extracurricular activities.

The analysis of auto reproduction of socio-educational profile between parents and their minor children on a sample of 163 respondents followed the schedule and orientation of leisure time of children under 15 or school-age in half (51.5%) of the sample, while the other half had no children school age. We noticed that the economic elite (both spouses), whose educational profile is mainly technical or natural education, directs their children the least in this direction – 1.8% and 5.5%, respectively (Fig. 1). At the same time, almost 75% of parents direct their children to regular sports training and learning foreign languages. Investments in art among the descendants of the elite also participate modestly (11%) in creating their values and lifestyles. These data represent a perfectly rational, not necessarily existential, long-term assessment of specific skills. Such rationality stems from the global trend of networking politics, capital, and sport, on the one hand, and the relevant marginalization of primary and significantly higher education (Mitrović, 2015).

Today, directing the leisure time of minor children is primarily a matter of their upbringing and acquisition of certain habits that can be vital to a particular lifestyle and later professional and social profile. In addition, parenting is

often a combination of parental ambitions, material capacities, talents, and the children's desires.

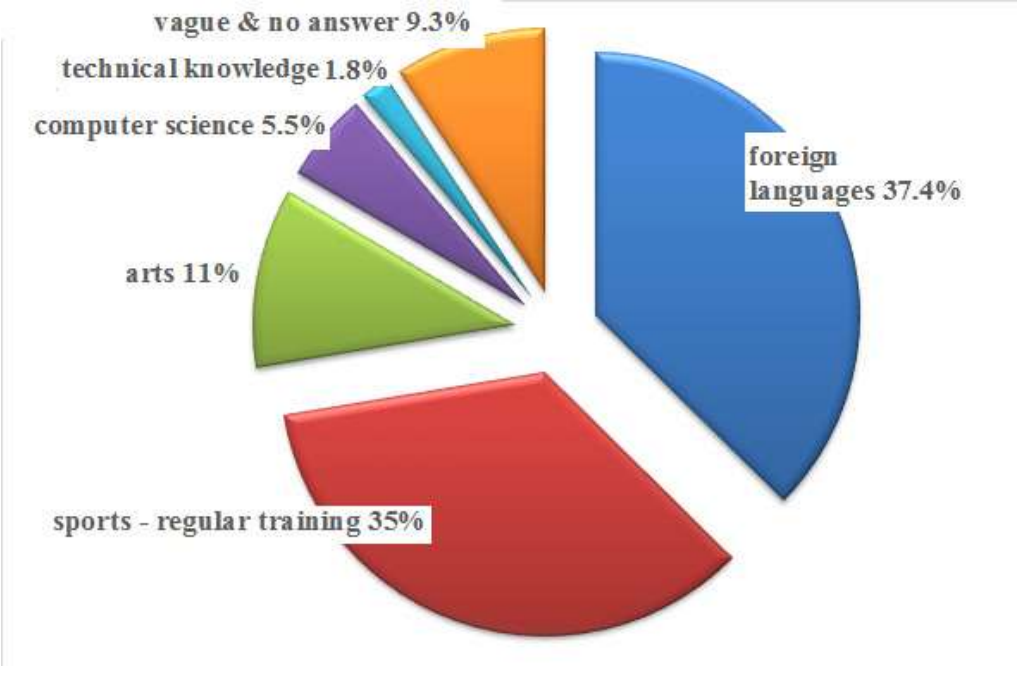

Figure 1. Extracurricular activities of the offspring of the economic elite

These results revealed a significant problem that education is of secondary importance for a good part of the group of businesspeople who, not only economically but also epistemologically, should be "exceptional" and a driver of social development. Moore[1)] also draws attention to the privatization of extracurricular activities, which the payment of fees made inaccessible to many, thus reducing the possibility for social mobility. The survey disagreed the Rogers' (2014) assertion that non-formal learning is not more marginalized but part of educational programs.

Sociological research suggests that the constitution and reproduction of capitalist social relations in Serbia have been, at least nominally, returning into the mainstream (Lazić, 2020). In other words, the survey results from the capitalist phase show global trends and no significant deviation since the year 2000,

which makes our data set from 2012 a relevant case for the contemporary study. Moreover, those data have not been considered from an educational perspective yet.

We drew our attention to a manoeuvre that points to the evaluation of sports and entertainment skills and activities concerning school and cultural activities, including technical and computer knowledge that could be characterized as existentially useful skills in the value system of our ancestors.

Materials and methods

In order to overcome obstacles in contemporary education trends, we created a non-formal environment in practical archaeology classes at the Faculty of Philosophy, University of Belgrade. Qualitative analyses enabled us to observe its benefits and disadvantages in students' learning. At the same time, we monitored teaching and teacher development with an introspective approach.

Formal learning occurs as a result of educational systems, which follow a syllabus with structured learning objectives. Learning is intentional from the learner's perspective while learning outcomes are certified in various ways (Rogers, 2014). Non-formal learning, on the other hand, is defined in multiple ways, with some essential features. It takes place outside formal learning environments but with some organizational framework. The programs are flexible and adaptable to the participants through interaction between teacher and learner (Rogers 2014). It is close to real-life concerns, experiential, and oriented to learning by doing, arising from the learner's intention to acquire a particular knowledge or skill.[2)] The evaluation of the outcomes is less developed and strict. Essential features of non-formal and informal learning are practical work and incidental learning.

Today, skills necessary for survival in the modern world are supposedly acquired in public educational institutions, yet our data demonstrated parents' lack of confidence in those and directing minors to off-school, non-formal learn-

ing. We turn to prehistoric times to understand what skills and knowledge people acquired and transmitted in the past small family and community circles, that is, the non-formal and informal learning environments. One of the basics was the making of stone tools, i.e. knapping. We recreate a non-formal environment for students to try, for the first time, to make a stone artefact in the way people did in the past, a skill they did not possess earlier.

Skill is an individual characteristic that involves both physical and mental abilities encompassing knowledge about a task and technical ability to complete that task. Knowledge provides a theoretical framework for accomplishing the aim, while technical know-how comes from practice and self-teaching (Apel, 2008; Finlay, 2008). However, today's skills and their acquisition differ from those of the past in nature, organization, and importance. Our reproduction of past activities should not be understood as analogical but rather as an informative and guidance instrument.

Learning products: past and present practice

Getting familiar with the knapped stone

After completing the second year of studies in 2006, I (the first author, M.M.) participated in excavating the Middle Paleolithic cave site. Although during two years of studies I had attended lectures and took exams in subjects related to the archaeology of Paleolithic, Mesolithic, and Neolithic, there were no practical classes, and I knew the findings of the knapped stone only through illustrations from suggested literature (and browsing the Internet). While digging carefully to keep as many findings as possible in situ, I remember bothering my older colleague supervisor, urging her to see and check every gravel if it was a knapping product, while she had been replying 'No. You will know when you find'. I listened to her in disbelief and kept asking her, "Is It?" Still, it happened as she said: I knew that the piece I found at the moment was It – a product of human hands: It was better raw material (quartz in that case) and had a more

delicate shape than the previously dug and 'discovered' pieces of plain limestone and breccia.

Fortunately, a few years later, practical classes for first-year students were introduced to archaeology studies. They covered subjects of different epochs, while students could get familiar with the material remains and the basics of their analysis. A few years after graduation, I found myself a lecturer there, tasked with imparting basic knowledge to students about knapped and polished stone products and bone tools. Also, students have been provided with the opportunity to try knapping and gain initial skills.

For several years, I have watched young people acquire the knowledge and skills to identify, interpret, and make knapped stones. Somehow, questions were arising on their own, how it used to be in the past, how people learned and were taught to manipulate the knapping products.

Learning from archaeological remains: how knapping skill evolved

Various processes and stages in skill acquisition have been identified in archaeological remains since the appearance of human knapping (Delagnes & Roche, 2005; Stout et al., 2011; Darmark, 2010; Eren et al., 2011; Geribàs et al., 2010; Whiten et al., 2009). It is believed that the beginnings of knapping were mimicking the breaking of nuts a few million years ago: our australopithecine ancestors would be placing a pebble on a surface and hitting it with another stone (Bril et al., 2015). Those were not only the first steps of the discovery of knapping of early hominids, but the same is true for beginners who learned stone manipulation in the past and also today. The first blows on stone, a child made and improved by playing. A family or a small group was an informal learning environment in prehistory. As the children were growing, the men of the tribe would demonstrate their skills, and others could imitate their movements and work. Children may begin to learn as young; however, they may fail to produce specific tools because they lack muscle mass and sensorimotor skills before they reach eight or nine years (Lancy, 2017).

Archaeologists' and anthropologists' questions on the motor and cognitive capabilities of pre-modern humans and search for individuals from the palimpsest of remains involve an analysis of knapped artefacts directed to assess the skill of the people of the past. The knapping activity requires preparation, such as choosing the hammer and raw material, and later behavioural sequence of individual movements and decisions, mutually dependent and oriented towards creating the desired product. The sequence of actions ceases when the knapper succeeds or fails to make the predetermined artefact. Movements, gestures (manipulating the hammer and worked material, body posture, rate of knapping), and decisions (planning the strikes, replacing the hammer, abandoning worked piece) result from previous theoretical knowledge and technical dexterity and create new knowledge and know-how. Subtle changes in skill cannot be immediately assessed and realized, and it usually requires years of training for one to ascend to higher levels of expertise. This understanding of the relationship between the knapping activity, skill, and the archaeological material (Lopičić, 2014) incorporates several viewpoints (Ingold, 2000; Wynn & Coolidge, 2004; Apel, 2008; Tostevin, 2011).

The assumed knapper's aim to maximize output from processed raw material led to recognizing variables and aspects of behaviour that distinguish different skill levels. Generally, two or three levels of expertise are distinguished and compared (e.g., novice-expert in Geribàs et al. (2010); unskilled-skilled in Stout (2002); novice-apprentice-expert in Darmark (2010); and naïve-trained-expert in Stout et al. (2011). An expert makes more precise movements as his understanding of functional parameters of knapping (such as kinetic energy, angles, and point of percussion) are better (Bril et al., 2010; Geribàs et al., 2010; Rein et al. 2013), so he produces less variation in artefact dimension and longer tools (De la Torre, 2004; Apel, 2008; Bleed, 2008). Ethnoarchaeological studies reveal and help us comprehend complex behavioural patterns and the ways of transmitting knowledge (Roux et al., 1995; Högberg, 2008; Olausson, 2008;

Stout, 2002; Stapert, 2007). They are precious as they stress that the skill is acquired and performed in social contexts. For example, various stages of production of flint daggers in the Scandinavian Late Neolithic took place at particular locations associated with different levels of theoretical knowledge and practical know-how needed for their manufacture (Apel, 2008).

Knapping products knowledge today – practice at the University

Today, internet sites and social networks provide easily accessible knowledge about the knapping stone with written and video tutorials. Knappers manipulate a wide variety of raw materials and hammers, and their experiences and observations are helpful to scholars. This chapter describes practical teaching at the bachelor studies of archaeology at the University of Belgrade.

Classes are held in student groups of 6-10 members. Theoretical lessons introduce basic raw materials and techno-typological categories, describing and illustrating pieces. Although I (M.M.) teach according to the general plan and objectives, the classes are adaptable to the needs and moods of each group separately.

The first encounter with the stones is the first task: students have to identify 'knapped' and' natural' stones while extracting the man-worked pieces from ordinary gravel to become familiar with the term 'knapped.' Students then learn to identify various raw materials: matte and transparent flint, chert, jasper, chalcedony, quartz and quartzite, obsidian, silicate rocks.

The next lesson is about the fundamental technological categories – cores, flakes, and retouched tools. Students are asked to recognize the characteristics of knapped pieces while keeping their eyes closed. They shut their eyes uncomfortably, being accustomed to inspection by sight, but after noticing the difference between retouched and untreated edges of the stone, they become more confident and examine more specimens independently. Later, students get acquainted with the basic types of retouched tools through illustrations and

pieces. It turned out that the names of retouched tools are difficult to remember, unlike how to hold and handle them.

An exercise is performed for an introduction to the tool lessons. I divide the students into groups and give each one a chopper to describe what it is for and how they would use it. They discuss, spontaneously demonstrate and sometimes even act out a situation where the tool can be used. In the same way, we consider large bifaces. The main conclusions regarding choppers are that they could serve for butchering, killing by throwing, and chopping nuts in vertical strokes. Similarly, bifaces are interpreted as spearheads, maybe a cult or symbolic object, beautiful because of their symmetry in which much effort has been invested. Interestingly, there is no difference in tool recognition between students who have previously attended and those who did not listen to regular Paleolithic and Mesolithic archaeology lectures, suggesting the minor importance of theoretical lessons.

Figure 2. A student practising *knapping on the anvil* technique

Figure 3. A student practising *direct percussion knapping* technique

` The drawing on the already known artefacts is taught to highlight their main characteristics in simple illustration and describe them.

Following those about techno-typological analysis, the class is dedicated to making knapped stone artefacts. Its plan is not well-established and predetermined but instead takes place spontaneously following the students' aspirations. The only goal is to make (any) artefact out of raw materials. Sometimes I demonstrate the basic movements of direct percussion while holding the processed piece in my hand, while sometimes, I encourage students to try to strike the stones in their way. However, everyone asks if they are allowed to put the processed stone on the ground. In that way, by knapping on the anvil (Fig. 2), students produce flakes (splinters) without difficulty. Direct percussion technique (Fig. 3), on the other hand, is more difficult for them, which mainly results in waste that accompanies irregularities in the raw material. Holding the stones (the hammer and the processed piece) in their hands, they sometimes make

movements as if breaking eggs (moving both hands horizontally and hitting stone against a stone), and very often striking the centre of the processed stone vertically. The correct move to produce a flake would be to hit the edge with a sharp angle.

` **Results**

Students' learning experience in a non-formal setting was assessed by observing their behaviour and analyzing their feedback (spoken, written, and recorded). A qualitative approach was applied because we did not have an initial hypothesis or planned research, but patterns were discerned by long-term participation in an interactive environment.

Learning aesthetic values

Scholars rarely (if ever) use aesthetic attributes when describing raw materials for knapping. Students, on the other hand, very often make aesthetic remarks. A pattern was observed between first- and final-year students when judging quartzite and Balkan flint, two common raw materials in the Mesolithic and Neolithic periods of the Iron Gates region (the Danube Gorges, border between Serbia and Romania). Archaeologists traditionally consider quartzite ugly, and Balkan flint (honey waxed with white spots) aesthetically remarkable. The research conducted based on psychological indicators of the connection between aesthetic and economic attributes concluded that Balkan flint could be considered more beautiful (Mitrović, 2017). However, the research results cannot be directly related to the archaeological material, as shown in the classroom.

In their first encounter with the knapped stone, students characterize quartzite as "nice, beautiful" for it "shines," "is bright," and (about pebble) "smooth" "it is gentle to touch its surface," and they remain indifferent to the Balkan flint. On the other hand, for final year students, who have already attended courses in prehistoric archaeology and technology of knapped stone artefacts, quartzite is "ugly" because it is complex and challenging to analyze, it

is "hard to see retouch, recognize hammer and anvil marks," so even distinguish knapped surfaces from accidental breakages. They expressed enthusiasm to the Balkan flint with "wow, superb," considering it beautiful because they had already learned about its preciousness in the region's neolithization. Older students seem to have had prejudices about quartzite because they have heard ingrained views that quartzite industries represent "technological decline" and "underdeveloped technology," especially in the area in question. Although these are just remarks, without a scientific sample, questionnaire or research, they show that we learn to judge aesthetics in the community.

The first knapping experience

Classes where students can try knapping and acquire basic skills have varied over the years. They took place indoors as well as outdoors. During one year, we provided the raw materials, together with stone hammers, consisting mainly of quartzite pebbles and, to a lesser extent, silicate rocks. The following year, we used contemporary discarded bricks. When the students were given the task of collecting raw materials and hammers themselves, a wide range of stones of various sizes and types appeared in the classroom, even one cube from the paved sidewalk.

Students initially try to knap with enthusiasm, but disappointment follows if they fail to break anything after 5-10 minutes. Then I first give oral instructions, and later I help and show them how to hold and manipulate stones, and most of them manage to break the raw material, restoring a good mood.

After the exercise, we discuss impressions, achievements, and failures, and students (voluntarily) describe their views on the whole event in short essays. I allowed the essays to be written anonymously to encourage students to share negative thoughts, so we did not provide statistical data of participants' gender and age. Overall, only 20-30% of students wrote essays, presumably because no obligation was imposed.

The word repeated in all essays is *interesting*, as one paper stated '... we have all agreed that it was very interesting '. Besides, similar adjectives were used: *entertaining* and *fun*, and the event is described as *useful* because it helped *to understand, to feel, to live, to learn, to experience* the way our ancestors lived and made stone tools.

In recent years, I have allowed students to choose whether they want to knap stones or record their colleagues while knapping, and then they have expressed their impressions.

The impressions of students who were knapping

"Our great ancestors were very resourceful in their time because it was necessary to know and come up with an idea to make something and use it in the right way."

"I wish we had a class like this again."

The impressions of the students who filmed the event are diverse

"He broke the stone with ease."

"... successfully hitting ..."

"The students were ruthlessly hitting the stones 'trying to reconstruct' at least some example of handmade tools dating back to the Stone Age ... I couldn't say that the whole project was very successful considering that even the students didn't seem to be sure what they were doing."

"It was not easy for them (our ancestors) to manage at that time, find the right type of stone, kill the animal with the same stone, and eventually 'rip it' and eat it."

"Certainly, the shooting wasn't as interesting as knapping," according to two female students, one of whom, for that reason, herself tried to knap.

Discussion and conclusion

Numerous research has recognized the importance of non-formal learning in various aspects (Brown et al., 2020; Tang et al., 2017; Rogers, 2014). We demonstrate the need to strengthen its status in public state education with two sets of quantitative and qualitative data characterized by the phrase *learning before education*.

Former toolmaking, sheltering, processing and food storage skills are comparable to today's technical and computer skills. However, although our ancestors have highly valued these skills, they currently do not make up 2% of the lifestyle of the descendants of the social elite in Serbia. Besides, the cultural exchange that enabled the development of creativity and fostered previous skills is similar to today's investments in art among the descendants of the elite. This activity also modestly (11%) creates their values and lifestyles.

These results suggest that education is of secondary importance for a good part of the group of businesspeople who, not only economically but also epistemologically, should be "exceptional" and a driver of social development. Nevertheless, such an attitude does not seem to have been prevalent constantly throughout their lives. By directing the activities of their offspring, they consciously or unconsciously send the message that the meaning of education is no longer the acquisition of necessary knowledge and expertise nor the satisfaction of an intrinsic good or personal values. Education becomes a mere facade that creates the opacity of today's meritocratic principles and develops the so-called 'discretionary principle awards.' The social demand is replaced by recruiting and forming a structure of new elite members from the currently dominant positions. New members of the elite must adapt, in every sense, to the demands of those above them, not to the objective needs and demands of society (Mitrović, 2015).

In addition to children's care and health care, developing their talents and skills is one of the highest social values. However, this does not mean that these

activities can replace the knowledge and skills provided by the general education system. Such additional activities are not a substitute but an upgrade of general and mandatory social and cultural knowledge and skills. Also, if parents' ambitions guide children's guidance, then such a one-sided approach in the development of offspring gives rise to the temptations of tyranny and impairs the relationship between parents and children. The distinction between supplementary and compulsory and general knowledge and education is primarily epistemological and functional. Therefore, the gradual and progressive decline in the valuation of education (observed in various aspects, such as media, social rewards, fashion, and dominant lifestyles) generates social concern and gives rise to general concern in an evolutionary-existential sense (Mitrović, 2015).

The interaction of humans, environment and culture defines our eco-niche, in which human and brain evolution occurs. Existentially, the value system, divided into categories of good and bad, enabled us to avoid toxic and dangerous things, marking them as bad while evaluating the desirable and valuable for survival as good. Learning skills such as tooling, sheltering, and the like were accordingly socially valued. The development of humankind demonstrates that intelligence, morality, and cultural capacity are essential to the survival of our species. In this process, learning and modern education are the primary social mobility and advancement channels.

This practice of knapping within studies of archaeology is an excellent indicator that prior acquisition of theoretical knowledge or passive absorption of information does not leave the same impression on students as actively participating in the cognition process in which they are engaged not only in the psychic/mental domain but also in the motor/physical one. These facts support the thesis that it is unjustified to direct children only to sports or learn foreign languages and neglect compulsory school subjects and additional skills such as technical knowledge.

Although I (M.M.) have only been teaching first-year students about the knapped stone, and the classes are partly planned and partly ad hoc, some conclusions and guidelines for further practical work and research can be drawn. In general, students are uncomfortable expressing their opinions and finding solutions for answers, fearing that they will make a mistake. Later, they gain self-confidence because there is no evaluation and understand that it is essential to discuss and seek solutions independently, that failures and mistakes are part of the scientific and learning process. Moisio & Suoranta (2007) emphasize the importance of abandoning traditional teaching roles and promoting dialogue and collaborative learning projects instead. We demonstrated that a practical non-formal environment empowers features of formal education and enables students to acquire a variety of skills.

As we suggested in our research, it is necessary to expand the range of additional activities and strengthen their position in-state public educational institutions, i.e., to make Rogers' (2014) claim that non-formal learning is not more marginalized but part of educational programs, more visible and realistic. The former acquisition of skills within a small family group (Nakahashi, 2015), which could be characterized as informal learning, has been replaced by the professional work of experts, most often with social and economic exchange (formal and non-formal learning). The hunter-gatherer learning model (as presented Terashima, 2016, Fig. 22.4) shows that some good practices of hunter-gatherers can be applied in institutional learning today, that is, the introduction of practical skills into education in the forms of non-formal and informal learning can have a positive effect on students. Non-formal learning programs are more flexible and adaptable to the participants through interaction between teacher and learner. The importance of non-formal and informal learning is widely recognized. Rogers (2014) calls for the interaction of informal and formal learning, emphasizing its role in assisting and strengthening formal and non-formal learning, while on the other hand "helping the learner to give recognition and value to their informal learning, making the unconscious conscious

through meta-learning." One of the European Union's focuses is promoting non-formal learning and strengthening its links with formal education.[2)] Ogawa et al. (2008) state that museums have changed their organization over the last half-century and become places for children and interactive science, while schools resist change. The authors presented the CHAT-IT model providing tools to identify and analyze changes in the institution as a result of interpersonal dynamics and the mechanisms by which institutions operate and maintain stability and social legitimacy.

Non-formal learning, at the level of society, provides equal access to resources, more precisely, skills and knowledge to all economic strata, which is the basis for social mobility. Students show interest and enthusiasm for practical classes in acquiring technical skills and fostering theoretical learning, i.e., learners become active participants instead of just passive listeners - observers. People of different professions feel connected to the object they are working on, and the connection is reciprocally described by the verb 'to relate' instead of 'manipulate,' a characteristic behaviour of hunter-gatherers. Terashima (2016) wrote: "... this learning cycle is embedded in the daily routine of searching for food and other natural resources. It starts with a desire to learn and ends with the joy of learning." Institutional education, which is supposed to provide survival skills for the future and possibly better lives in the modern world, can partially adapt to the pursuit of learning that has remained unchanged for thousands of years in human essence.

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NOTES

1. https://www.theguardian.com/commentisfree/2017/jun/28/to-most-political-leaders-social-mobility-is-no-more-than-a-vague-goal-like-world-peace

2.https://rm.coe.int/2012-compendium-non-formal-education/168077c10b

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