Session 10: Informal Education in Astronomy

Introduction

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Session 10, the last of the symposium, begins with the invited talk "Embracing a culture of lifelong learning - in universities & all spheres of life" by Edith Hammer where she discusses the important role of life-long learning. She describes this as being key to addressing the many challenges that humanity faces. Edith describes that learning to learn is a fundamental skill to be mastered in order to master continued learning throughout life. She states that lifelong learning is for all and it is imperative to create learning opportunities that can reach everyone.

Edith was asked by Walter Guevara Day:

What do you think should be done so that this lifelong learning is extended to all ages and especially to the very young and the elderly, who are increasingly displaced in some countries.

and she responded:

There is a broad range of actions to be taken to make LLL a reality, including the integration of the concept of LLL in education and development policies and strategies, strengthening educational institutions with a LLL perspective, establishing flexible educational pathways and mechanisms for the recognition of prior learning, among many others. In a recent report on the futures of LLL, the UNESCO Institute for Lifelong Learning has proposed 10 key messages and a set of actions points to "Embrace a culture of lifelong learning". These 10 points are: Recognize the holistic character of lifelong learning; Promote transdisciplinary research and intersectoral collaboration for lifelong learning; Place vulnerable groups at the core of the lifelong learning agenda; Establish lifelong learning as a common good; Ensure greater and equitable access to learning technology; Transform schools and universities into lifelong learning institutions; Recognize and promote the collective dimension of learning; Encourage and support local lifelong learning initiatives, including learning cities; Reengineer and revitalize workplace learning; and Recognize lifelong learning as a human right. The report is available here: https://unesdoc.unesco.org/ark:/48223/pf0000374112?posInSet=1 & queryId=6f6d2b66-c054-4f6a-8563-293f7697c717

William Waller asked:

In the absence of a local university, what would you recommend to engender LLL in a community?

Edith answered:

In urban areas, usually there is a good educational infrastructure, including universities and other educational institutions. In rural areas, this may not be the case. Many different stakeholders can contribute to provide lifelong learning opportunities to people of all ages. For example, community centers and community libraries have helped to

engage local people in learning processes in countries around the world. Some good examples can be found in UIL's publication on "Communities in Action: LLL for sustainable development", available here: https://unesdoc.unesco.org/ark:/48223/pf0000234185

Also, many universities and platforms such as Coursera offer online courses (MOOCs), which are available to anyone with an internet connection. This can also be a chance for individual learners in structurally less developed areas to engage in higher education.

"Turn on the Night! Science and Education on Dark Skies Issues" was written by Constance Walker, Richard Green, Pedro Sanhueza, and Margarita Metaxa. In it they talk about the IAU's Dark and Quiet Skies working groups and some of the latest dark skies protection issues. They also discuss dark skies education and heritage.

Andrea Sosa writes of "Let's turn off the lights and turn on the night: to the rescue of starlight in an age of artificial lighting." Andrea relates that an estimated one-third of the population of the world has never seen the Milky Way due to light pollution and the fundamental loos experienced as a result. She outlines reasons to work to minimize light pollution and discusses some global initiatives to do so.

Next is "The search for extraterrestrial intelligences and the Fermi Paradox" by Nikos Prantzos. Here Nick talks about the search for extraterrestrial intelligence and he includes discussions of the Drake Equation and the Fermi Paradox. He outlines current thought and states that the plurality of worlds is more controversial today than ever before and includes that the detection of an inhabited planet would be one of the major events in human history.

Harufumi Tamazawa discusses "Sunspot observation by the cooperation of amateur astronomers and researchers in Japan in early 20th century as early citizen science program." He emphasizes the merit of cooperation between astronomers and amateur observers and the increasing popularity of doing so. Harufumi gives examples that underscore the value of working together in such projects.

"Solar Eclipses in India's Cultural and Political History" is described by Ramesh Kapoor. He discusses early records of eclipses in India and how they can help to fix timelines in history. He gives several examples dating form as early as 322 CE. The paper show eclipses to be interwoven with life an culture in India.

The final paper, "Estrelleros: Astronomy in hospitals," was written by Gloria Delgado-Inglada, Diego López-Cámara, Alejandro Farah, Jorge Fuentes-Fernández, Orlando García, Carolina Keiman, Tita Pacheco & Jaime Ruíz-Díaz-Soto. The authors describe an initiative designed for children who must endure long hospital stays. The effort is not only entertaining, but even more so is designed to increase their scientific knowledge and promote the pursuit of scientific vocations. Examples from Mexico are given and the authors discuss future expansion of the project.

drom Milagros Vera asked:

How do you finance the project?

and the response was:

We have obtained financing mainly from the Mexican Consejo Nacional de Ciencia y Tecnología through two different programmes in 2019 and 2020. One to promote scientific vocations and the other to carry out activities of social appropriation of scientific knowledge. Also our institute support us in many different ways. For example, bringing all the material and volunteers to the hospital.

Walter Guevara Day asked:

Now, With the pandemic problem, how are they doing?

with the response:

For obvious reasons, we have not been able to visit hospitals this year. We have concentrated on generating new material, creating a manual for the activities and preparing everything to be ready for the moment when we can visit hospitals again. In 2021 we plan

to carry out virtual visits. We still do not know exactly how to do it and which activities and hospitals are the most adequate. It is a big challenge but we are ready to face it.

Susana Deustua asked:

Have you been in contact with others who carry out these types of activities? Donald Lubowich has many years working with patients in NY.

and was answered with:

Not yet but in this conference I have met some interesting people such as Donald Lubowich. I plan to talk with them to improve and expand our project.

Embracing a culture of lifelong learning – in universities & all spheres of life

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Abstract. This presentation will provide an introduction to the concept of lifelong learning, exploring its relevance and potential for future human development. Lifelong learning – comprising learning in formal education, in non-formal contexts and informal ways – plays an increasingly important role within society and also within the higher education sector. Universities have a social responsibility towards society, conducting research that benefits society, making research results widely and openly available, communicating research to the wider community, and providing learning opportunties for people of all ages and social backgrounds.

Increasingly, the global community acknowledges that lifelong learning – available to all, at every stage and in every sphere of people's lives – is key to addressing the multiple challenges faced by humanity. Lifelong learning fosters people's capacity to deal with change and to build the future they want. This is profoundly important given the disruption and uncertainly resulting from the familiar threats and opportunities of demographic change, the climate crisis, the rapid advance of technology and, more recently, the COVID-19 pandemic. In such uncertain times, new ways of learning provision have to be found.

Learner autonomy is the foundation of this lifelong learning culture. Learning to learn has become a basic competence, as has managing one's own learning journey and creating one's own learning biography. Understanding all levels of learning as learner-centric presents a crucial shift to fundamentally thinking and planning education with demand in mind. This way, learners are active agents rather than passive recipients of prescribed knowledge. They co-design and use any learning process and its outcomes actively to realize their potential as fully as possible.

Learning is understood as a collective process, taking place among peer groups, within communities and across generations. Education emphasizes becoming global citizens who care about each other, other communities and the planet. Consequently, lifelong learning is for all, and learning opportunities can be created for and with the most excluded learners. There is a global learning ecosystem, built collectively to inspire and empower learners with a plethora of opportunities. The learning ecosystem integrates diverse learning modalities fluidly, including all digital-based and real-life experiential learning as well as blends of formal, non-formal and informal learning. The learning opportunities allow for planned or spontaneous, individual of collective learning. There is easy access to face-to-face and online learning opportunities as local infrastructure, global connectivity and sponsored devices are available for all. New pedagogical and andragogical principles have been developed, including innovative blended learning concepts that integrate digital and face-to-face elements while considering learners' specific needs.

The presentation will link these future-oriented ideas of lifelong learning with the higher education context, the open science movement and explore ways in which research-based knowledge can be provided to learners in different contexts.

Keywords. Education, Lifelong learning, UNESCO

1. Defining lifelong learning

The concept of lifelong learning implies that a learning process is no longer constrained within a prescribed life span or the walls of a formal institution, but rather extends throughout life and occurs in various settings. There are five essential elements to the UNESCO definition of LLL (UIL, forthcoming):

All age groups. Lifelong learning is a process that begins at birth and occurs across the whole lifespan for people of all ages and origins with learning opportunities and activities, depending on their needs and professions.

All Levels of education. Lifelong learning links all levels and types of education to build adaptable pathways between them. This includes early childhood care and education (ECCE), primary and secondary school education, higher education, adult and non-formal education, as well as technical and vocational education and training (TVET).

All learning modalities. Lifelong learning recognizes all modalities: formal (institution-alized, leading to recognized qualifications), non-formal (institutionalized, alternative or complementary to formal education, usually not leading to recognized qualifications) and informal (not institutionalized, on a self-directed, family-directed, community or socially directed basis).

All learning spheres and spaces. Schools are just one part of a wide learning universe, a space which also includes families, communities, workplaces, libraries, museums, and other online and distance learning platforms. Hence, building bridges between formal and diverse non- formal education to create new opportunities for learners.

A variety of purposes. Lifelong learning is people – oriented and human – rights based, providing people with opportunities to develop their potential throughout life, regardless of the starting points, addressing a wide range of learning needs and contributing to the development of an inclusive society and an advanced economy.

2. Relevance of lifelong learning within the higher education sector

During the past decades, the mandates of universities and higher education institutions have changed, addressing new groups of learners and responding to their social respon-sibility. Given the current demographic and socio- economic transformations, the role of higher education in addressing societal challenges and projecting positive impact have increased. Universities now have a distinct role in (re-)educating highly qualified people to meet the changing demands on labour markets, thus requiring quality education with a focus on the needs of diversified groups of people.

Universities, on top of their traditional missions of teaching and conducting research, are expected to fulfil roles that reflect economic, social and cultural contributions to their local environment. The so-called 'engaged university' plays a local development role by offering lifelong learning and other services that contribute actively to shaping or reshaping the social, cultural and economic situations of local communities. That can be done through outreaching to a wider scope of non-traditional students, such as working professionals, older people, people of low socio- economic backgrounds, migrants, ethnic minorities, people with disabilities, people from remote areas, among others.

3. Transforming universities within a framework of lifelong learning

Transformations of universities to become lifelong learning institutions occur at insti-tutional level and encompass modifications in policy frameworks and support. In the last 15 years, several international and regional frameworks and recommendations have been drafted, emphasizing an important role of universities in promotion of lifelong learning. They furthermore, outline major areas of transformations.

In 2008, the European Universities Association (EUA) issued the European Universities' Charter on lifelong learning, which called on universities to make 10 clear commitments to lifelong learning. The EUA Charter also recommended concerted action from governments in providing the appropriate legal and financial frameworks to promote lifelong learning widely (EUA 2008).

A year later, the 2009 UNESCO World Conference on Higher Education stressed the role of higher education in lifelong learning and stated "the knowledge society needs diversity in higher education systems, with a range of institutions having a variety of mandates and addressing different types of learners. This includes promoting research for the development and use of new technologies and ensuring the provision of technical and vocational training, entrepreneurship education and programmes for lifelong learning" (UNESCO 2009).

In 2015, the United Nations' 2030 Agenda for Sustainable Development, specifically Sustainable Development Goal 4 (SDG 4), called on the world to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all". It is further specified to "ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university" by 2030 (Target 4.4).

4. Embracing a culture of lifelong learning

During May and June 2020, the UNESCO Institute for Lifelong Learning (UIL) invited 12 experts from different fields (including demography, economics, education, philosophy, public health, neuroscience and sociology) to take part in a three-weeks online consultation to reflect on how lifelong learning can contribute to building a desirable future by 2050 and to propose concrete measures. This collaborative work resulted in a report entitled "Embracing a culture of lifelong learning" (UIL 2020). The report is a future-focused vision of education, which requests a major shift towards a culture of lifelong learning by 2050. The challenges that humanity faces, resulted from various changes in climate, technology and demographics, and changes caused by COVID-10, call for societies to take action. Thus, education has to be learner-centric with a demand-led approach, allowing for learners of all ages and backgrounds to co-design and use a learning process to achieve their full potential. At the same time, learning has to be a collective process that acknowledges the value of peer and integrational learning.

The report includes 10 key messages to realize a culture of lifelong learning (Fig. 1). These messages strive to rethink the purposes of education and the organization of learning. They also contain tips for actionable directions such as translating visionary ideas into policy, research agendas and initiatives. All key messages presented in the following illustration are linked with each other. Together they help to realize a new vision for lifelong learning by 2050. Also, they are relevant to transforming the field of higher education:

(a) **Recognize the holistic character of lifelong learning**
   To provide a holistic perspective on learning, two dimensions can be stressed: First, there is a need to recognize the anytime principle of learning and its materialization through learning pathways. Second, the anywhere dimension refers to the vision of an ecosystem of learning with decentralized and diversified learning provisions, as the boundaries between formal and non- formal and informal learning have been blurred and non-formal learning may take place in a context of a formal education institution. Moreover, technological advancement brought a larger selection of means and modalities to facilitate learning pathways for every group and every person, allowing for combined education and training, formal, non-formal and informal

Figure 1. Key messages for fostering a culture of lifelong learning (UIL (2020)).

learning, face-to-face and distance education, and directed and self-directed learn-
ing. Within the context of higher education, information and guidance services
for students and potential students are key to support flexible learning pathways
into and throughout higher education, as well as to ensure possible transitions into
other fields of education or the employment sector.

(b) **Promote transdisciplinary research and intersectional collaboration for
lifelong learning**

Lifelong learning has been widely recognized as a powerful tool for developing more
sustainable societies, economies and living environments. To harness its potential
to create a sustainable future for the next generations, fostering transdisciplinary
approaches and intersectional collaboration will be a key. Transdisciplinary and
intersectoral collaboration should include joint research, as well as practical imple-
mentation of innovative initiatives, such as development of blended pedagogies to
bridge conversational and digital learning. From the perspective of LLL, one of
the main challenges for education system is to offer flexible learning pathways,
within and outside formal education, allowing individuals to accumulate different
learning experiences throughout life.

(c) **Place vulnerable groups at the core of the lifelong learning agenda**
Lifelong learning includes a diversity of learning modalities, so that people that were previously excluded should be able to join. Inclusive education encourages an active role and the participation of learners, their families and other communities. As lifelong learning is for all, vulnerable groups such as migrants, refugees, older people, youth and adults in risk, and people with disabilities must have equal opportunities to learn. Recognizing the value of interdisciplinarity, inclusive education aims to strengthen the links between schools and society to enable families and their communities to participate in and contribute to the educational process. In order to foster an inclusive and just society, vulnerable, disadvantaged and marginalized groups need to be placed at the core, and that is achieved with policies and instruments, and mainstreaming the focus in the entire legal, policy, delivery and funding framework.

(d) **Establish lifelong learning as a common good**
To ensure the availability and accessibility of learning opportunities for all, the trends towards market regulation of education provision should be gradually replaced by a commons approach through which voluntary social collaboration in open networks is used to generate social-environmental value. Establishing education resources and related tools, including IT solutions, as common goods allows institutions to manage them as commons, sustainably and equitably, in terms of participation, access and value. To widen access, the concept of a commons (such as open access, open source, open educational resources and co-operative online platforms) should be applied to lifelong learning initiatives.

(e) **Ensure greater and equitable access to learning technology**
In a rapidly developing world digital skills are paramount in achieving key policy goals, including employability, meeting labor market needs in a forth industrial revolution, strengthening social inclusion and contributing to a vibrant democratic life. Digital technology can offer innovative ways to engage, support and assess learners of all ages, providing them with opportunities for more adaptive, personalized and responsive learning for everyone, even the ones prior excluded. Lifelong learning plays an important role in contextualizing the use of technology and highlights its application in different parts of life and learning. The distinction between formal, non- formal and informal learning has been a key element in making sense of what is being learned through digital technology.

(f) **Transform schools and universities into lifelong learning institutions**
The lifelong learning perspective recasts the role of educational institutions and highlights the need to transform schools and universities into lifelong learning institutions. This process requires a revision of curricula, more flexibility in terms of study programmes and learning formats, including the introduction of stackable credits as an alternative to full degree programmes. Also, access to higher education should be widened through multiple learning pathways, depending on learners' abilities and needs. By shifting their attention from 'what to learn' to 'why and how to learn', higher education institutions can better conceptualize and link students' prior knowledge and experiences. The transformation of pedagogies is another essential element of this transformation. This implies that teaching and learning are guided by the principle of epistemic pluralism, meaning that teachers cultivate a critical and explorative attitude among students and support the development of different perspectives on particular subjects. Last but not least, universities should cater to the needs of the wider community by making their facilities and resources available for adult learning and education. They should reach out to and involve local communities in teaching, learning and research activities.

(g) **Recognize and promote the collective dimension of learning**
Learning as a collective endeavor is deeply rooted in all cultures and is evident in concepts such as learning neighborhoods, learning circles, and leaning communities and families, all of which acknowledged as social dimension of learning. The collective dimension puts renewed emphasis on face-to-face learning, particularly in public spaces, and also acknowledges the potential of new technologies, enabling digitally linked learning collectives with similar interests. Furthermore, it emphasizes that education is guided by the idea of educating to care, not to compete. Such understanding promotes social cohesion and is a crucial aspect in building learning cities or working towards the creation of a learning planet.

(h) **Encourage and support local lifelong learning initiatives, including learning cities**
Cities are favorable settings for promoting lifelong learning for all with their population density, available infrastructure and capacities. The concept of 'learning cities' is a people-centered and learning focused approach, which stresses a collaborative, action-oriented framework for working on the diverse challenges that cities increasingly face. Some cities managed to foster a lifelong learning culture by connecting education and training institutions and cultural institutions and engaging a wide range of partners. At community level, learning opportunities often include spontaneous forms relevant to the specific needs of communities, such as initiatives to promote environmental sustainability, to support women's health or to forge new types solidarity. These community-driven initiatives are key to achieving the potential of lifelong learning and often encourage integrational learning.

(i) **Reengineer and revitalize workplace learning**
Workplaces across sectors, including for the self-employed and those working in the informal economy, are potentially important learning environments, even more so if enterprises become learning organizations. Workplace learning is a crucial driver for lifelong learning and becomes increasingly important, considering the ongoing transformation of the nature of work and the changes taking place in the labor market. For workplace learning to reflect a culture of lifelong learning, there is a need to individualize learning opportunities in response to each worker's needs and to follow progressive models, focusing on developing workers' autonomy at work, as well as flexible, short courses and various incentives, including financial rewards and options for recognition, validation and accreditation.

(j) **Recognize lifelong learning as a human right**
The right to education is no longer limited to accessing the school system, but rather serves to guarantee continuity of learning throughout life, including relevant guidance and digitally portable assessment of all learning outcomes. Lifelong learning is strongly connected to the idea of learning freedom with an ecological dimension. On the grounds of it being a human right, lifelong learning could also serve as an indicator of social justice. As such, lifelong learning would not be defined only as an individual right, but as a social right universally accessible to all citizens. Lifelong learning is guided by three imperatives: access to learning always (across countries and languages); resilience (an educational commons that can withstand different crisis); and transparency (learning resources and facilities, including software and technology, must be open and part of the public domain).

5. Final remarks

Making lifelong learning a reality requires more than innovative policies, more funding or better technology. It demands a radical change, a cultural transformation involving

all stakeholders, governments, individuals and employers, as well as urban communities, notably learning cities. Higher education institutions are crucial stakeholders in this transformation process by including people of different background and of all ages in learning processes. They play a vital role in addressing societal challenges and serving their communities.

Transforming higher education institutions within a framework of lifelong learning will require some effort. One of the first steps is to revise curricula and develop new concepts for teaching and learning. That also includes an increased use of technologies and digitalization of education processes to meet the requirements of the modern world. Making the internet and AI central to the lifelong learning agenda and applying a commons approach to education involves making technology gradually open and accessible to all. Flexible learning pathways have to be introduced in order to respect the diversity of individual learning biographies and more opportunities should be available for people to continue their education at any point of life. Lifelong learning is a collective endeavor, it is about learning from others and with others. To ensure a high relevance of learning opportunities, learners (in particular vulnerable groups) should be involved in co-creating knowledge and learning resources. The promotion of open access resources for teaching and learning are also crucial for transforming higher education.

Openness shall be a guiding principle of higher education: Within the Open Science movement, openness refers to several factors: an important issue is the accessibility of knowledge, as well as teaching and learning resources. This is related to the need of more diverse open access practices in the higher education sector and beyond, to make the results of (often publicly funded) research openly accessible (e.g. through national and/or institutional open access strategies). Open science also refers to the principles of openness to different types of knowledge, including from traditionally excluded group (indigenous groups, scientists from the Global South, etc.) as well as diversifying publishing languages. Another important aspect is the promotion of community-based participatory action research and citizen-science approaches in higher education.

This brief summary report of the presentation on "Embracing a culture of lifelong learning" aimed to illustrate that reimagining the future of education from a lifelong learning perspective can help us think our way to a future that is more cohesive, sustainable, inclusive and generally brighter.

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