

Developing Critical Digital Literacies

Resources for Teachers' Professional Development

**FORMAR
TRANS-
FORMAR**



“Adopting Lifelong Learning Ecologies to support the development of critical digital literacies”

Juliana E. Raffaghelli

Marc Romero Carbonell

Teresa Romeu Fontanillas

Edu@b Research Group



Introduction

Lifelong Learning Ecologies are a concept that aims at addressing the complexity of learning in our contemporary society. The concept seeks to overcome separations that are no longer useful in a situation where learning happens across several contexts of life and particularly beyond formal education (Sangrà, Raffaghelli, & Guitert-Catasús, 2019). In fact, the abundance of resources in the open and social Web has created unprecedented learning opportunities. The new forms of learning have emphasised attributes such as “complex”, “self-organised”, “connected”, and “adaptive”, where it is highlighted learner’s freedom of choice (Kop & Fournier, 2010; Siemens, 2008). Moreover, the possibility of blending digital activities with on-site activities has led to the hybridisation of learning contexts, where the learners experience a sort of “continuum” while searching for resources, cultivating relationships and engaging in activities to help them achieve their own, more or less, conscious learning goals (Esposito, Sangrà, & Maina, 2013). Therefore, the idea of cultivating learning ecologies attempts to wrap up this complexity and provide new directions to design for learning and to develop lifelong learning trajectories. Along the years, the concept has been considered particularly useful to explore the way technological fluency is developed (Barron, 2004), to understand adults and professional learning (Maina & González, 2016; Sangrà, 2015) to orchestrate an expanded classroom in several disciplines, from language to science learning (Gutiérrez, Bien, Selland, & Pierce, 2011; Krumsvik, Jones, Øfstegaard, & Eikeland, 2016; Lai, Khaddage, & Knezek, 2013). Most importantly, the concept has been adopted to re-think teachers’ professional development (Romeu-Fontanillas, Guitert-Catasús, Raffaghelli, & Sangrà, 2020).

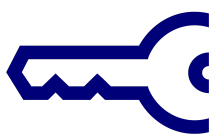


On these sound research bases, in this resource, we share ideas to develop lifelong learning ecologies at school to support teachers and students’ critical digital literacies. We believe that an approach that moves beyond the classroom and involves the whole school as a community, jointly with families and local institutions, including the university, can generate a robust educational ecosystem where the learning ecologies thrive.

Lifelong Learning Ecologies: An operational definition

The ecological perspective was adopted in the social sciences in the early eighties through Bateson's pioneering interdisciplinary approach to studying human behaviour in his work "Steps to an Ecology of Mind" (Bateson, 1987). Also, Bronfenbrenner (1979) had characterised human development as a process based on interactions at several social levels in what he called "the ecological systems theory". In his approach, Bronfenbrenner described the individual's ability to appropriate several resources for competence development.

While both the authors above see the socio-cultural system as complex and multilayered and developing in the same way as an ecology does, Bronfenbrenner's perspective emphasises learner agency about her engagement with self-development. In the educational context, lifelong learning ecologies have been defined in several ways in the literature, as we mentioned before, but based on our research activity (Morer, Raffaghelli, González-Sanmamed, & Muñoz-Carril, 2021; Romeu-Fontanillas et al., 2020), Edul@b offers the following operational definition:



Lifelong learning ecologies are the “invisible” structure generated by learners, including the activities, resources, and relationships triggered by the learners’ active or guided search to learn about a topic of their interest.

These structures are “alive”, and change and are also shaped by the learner identity and her historical approach to learning, as well as by the opportunities given by the institutional and socio-cultural spaces she moves through. Raising learners' awareness of their learning ecologies will empower and encourage them to engage in more agentic practices, which implies new and better learning opportunities amid the chaotic abundance that so often characterises the digital society.

Which are the critical elements of a learning ecology?

The organisation CORE Education - Tatai Aho Rahu (2018) has identified the learning ecologies as a relevant trend in education and has discussed their elements aligning with the definitions given in the science of ecology (See Table 1)

| Elements of an Ecology | Characteristics of a learning ecology |
|---------------------------------------|--|
| Habitat | Recognises that learners continue to learn and grow in a wide variety of settings, including formal and informal settings and face-to-face and virtual. |
| Territories and niches | Recognises the unique and valued contribution, including teachers, parents, community ‘experts’ and peers, to ‘making learning happen’, and that everyone in the ecology is a learner. |
| Self-regulation (within the system) | All members of the ecology have agency and are capable of demonstrating leadership. Primary forms of assistance are ‘relational’ forms of support such as network building, developing connections between participants, institutional alignment of priorities, fostering peer-based interactions etc. |
| Development, transformation over time | <p>Learning activity is characterised by:</p> <p>Collaborative Inquiry – the engine of change – is built on the understanding that the solutions we seek exist within the network and will emerge through working jointly to challenge thinking and practice.</p> <p>Knowledge building – being able to work with what is known (i.e. the knowledge from theory, research and best practice) and what the schools know (i.e. what the practitioners know) to create new knowledge (i.e. the new knowledge created through collaborative endeavour).</p> <p>Participatory and informed decision making – knowing how to access and use information that circulates through participatory spaced to make the decisions that matter for learners. The information can be sought within and beyond the school.</p> |

Table 1 – Elements of Learning Ecology that align with ecological systems

To keep on exploring the several elements in a lifelong learning ecology, let’s take a look at the inspiring design made by Giulia Forthsite (2014) upon the basis of Albert Sangrà’s conference:

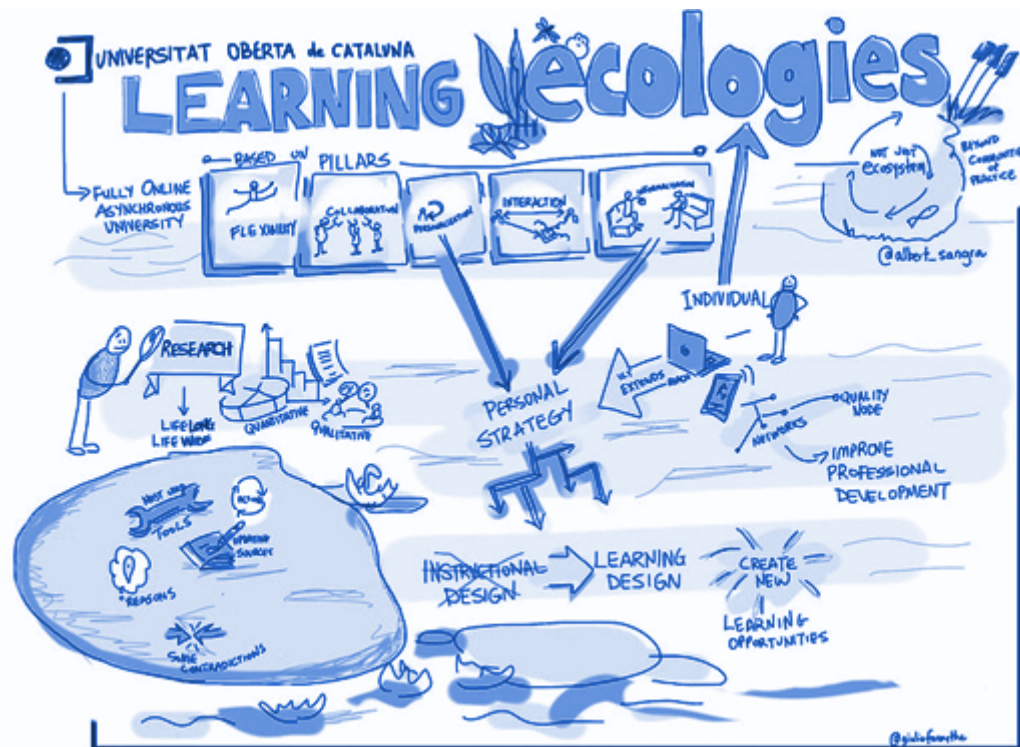


Figure 1 – why lifelong learning ecologies are important?

In this figure, we can observe how the learner moves across several contexts and spaces to generate a personal strategy, which is individualised. Another relevant element is that we cannot implement “instructional design” as a teacher/educator fixed and preliminary activity before entering the classroom. Instead, we must (as educators) design activities that support the learner to cultivate the best strategies across several spaces: generate or promote learning opportunities.

The ecological approaches concerned with teaching and learning issues are strongly linked to the legacy left by studies on biological ecosystems, which characterise the school, the classroom and the Web as ecosystems for learning, to those that treat the Web as a new kind of learning environment or as a component in a more complex entanglement of individuals and tools, which constitute ecological components (Esposito, Sangrà Morer, & Maina, 2015). Nonetheless, a common theme across several studies is the ecological perspective conceived as a cyclical, complex and emergent phenomenon (Haythornthwaite & Andrews, 2011).

In more simple terms, we assume that:

- Learning happens across several (but connected) contexts of learning, where the classroom is included, but might not be the most relevant!
- The learners actively search for interactions with others and with resources to develop their knowledge and skills, particularly when they believe such learning will help find a balance (an ecological dynamic equilibrium or homeostasis) relating to their social life.

- The learners will undertake activities, either alone or in groups, that will help them be exposed to knowledge, practice and improve skills that they consider valuable in their search for a balance relating to social life.

How does a learning ecology look like?

Here is an example of a teacher professional learning ecology, connected with their digital competence, as mapped through interviews by Edu@b

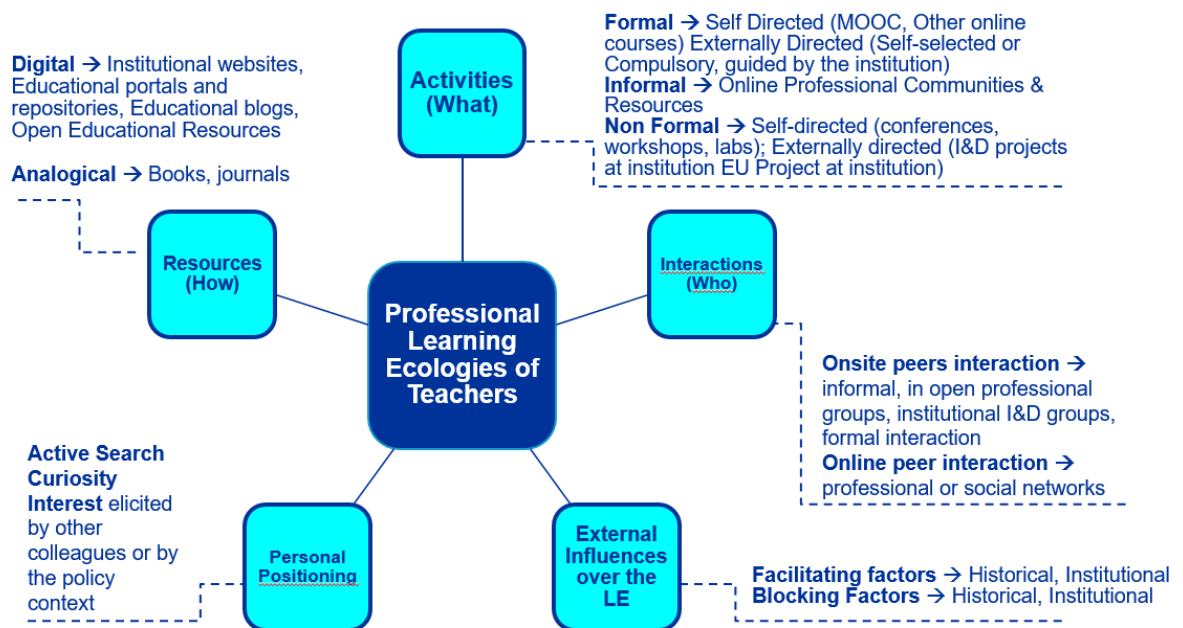


Figure 2 –The teachers’ professional learning ecologies

Which are the school and the educators’ roles if the learner can do everything alone?

The educational institutions are able of defining strategies that are also in line with socio-political contexts of development. Therefore, they can help learners pay attention to topics and social agendas that might be hidden or less visible to them in their homes or communities. Also, the educational institutions and the educators are professionally entitled to provide support and enrich the learners’ search to develop their learning ecologies.

Nonetheless, the school (and/or other educational contexts) can orchestrate the means to improve learners' opportunities to engage in activities, develop relationships, and find or even build resources that are crucial for the individual learning ecologies.

Also, as in the pure ecological theory, several ecological systems interact, particularly the teacher (as a professional learner) and their students. But also, the school as a whole, the parents/families ecological systems, and other eventual actors from the community generate mutually beneficial opportunities.

Let's think of a case that required a critical approach to digital technologies (as a specific area of knowledge nurtured by learning ecologies): the Emergency Remote Education (ERE), as the approach adopted during the lockdown corresponding as a measure to the pandemic COVID19.

The most successful schools in tackling the several problems connected to ERE were those in which the strategies were discussed and analysed by teachers' task forces, considering the situation at the students' homes. Therefore, support was provided through devices (even recycled devices) and through activities to develop the parents' digital literacies and the teachers' learning and digital well-being. In this regard, the schools evolved in search of "homeostasis" with the external ecological systems. This way nurtured the students, teachers and families learning ecologies around online pedagogies, digital literacy, and usage of the digital medium that protected all participants physical and mental health (Bozkurt et al., 2020; Carretero Gomez et al., 2021).

As we can see, we try to move from the idea of the educational institution as a structure that supports teaching but as a complex system that searches to generate reverberations across ecological subsystems to support learning.

Considering these assumptions, in the following, we offer tools for the school to undertake two relevant actions:

- Making learning ecologies visible
- Supporting the development of learning ecologies as an overall school activity

From the visibility to the development of learning ecologies

Mapping learning ecologies is an approach that has been widely developed by Norman Jackson (Jackson, 2013).



In his operational approach, Jackson offers a guide helping teachers to map their learning ecologies (Jackson, 2019). His idea is to “become a cartographer of our own experiences mapping our processes and their effects, and the changes that happen to us as we perform and learn”

(<https://www.learningecologies.uk/mapping-learning-ecologies.html>).

Let's dig into the elements as we have reworked here:

- **Situate the domain of knowledge where learning is to happen.** Which is the topic or area of knowledge where the learners will try and develop their learning ecologies? From technological fluency to entrepreneurial competence, from the second law of thermodynamics to capturing data with sensors in biology experiments to understand the effects of climate change, any area of knowledge encompasses activities, resources, interactions in connection with the learners' identity and the opportunities offered by the context. Start by focusing on the domain of knowledge: the more specific, the easier the analysis or mapping of existing learning ecologies.
- **Explore the elements of the several learning ecologies converging in a space/context of learning.** After situating the domain, it is relevant to start a visual and narrative approach to understand the learning ecologies of a) the students; b) the teachers; c) other colleagues in working groups. A good strategy is to generate “workshops” to map together with the several learning ecologies. Therefore, the several participants can map the resources, activities, relationships within and beyond the school adopted to nurture the learning ecologies around a domain of knowledge. The tools that can be adopted are narrative (questionnaires, interviews, teachers' logs). Still, visual approaches are faster and work very well in generating integrated maps with different learning ecologies to spot “rich” and “poor” areas in the educational ecosystem. For example, a simple design on a paper placing icons or short keywords relating the resources, activities, relationships can be hence placed in a wall (digital or physical). The convergent resources, activities and relationships can be aggregated into a common/shared map. Also, the areas of absence can be noticed through visual mapping.

- **Identify “rich” and “poor” areas in the educational ecosystem.** Once the teacher has mapped the students learning ecologies and possibly several working groups at school have approached the professional learning ecologies. The visual aggregated representation will make emerge the areas in which the convergent resources or activities or relationship provide a solid basis for professional development and hence to implement pedagogical practices with impact on the students’ learning. Also, it can be observed whether the areas of convergence are parallel or “isomorphic” to the learning ecologies mapped at the students/classroom level. Finally, the mapped learning ecologies might also uncover areas where we need to intervene and strengthen the educational ecosystem.
- **Establishing forms to nurture and support learning ecologies.** At this point, design-thinking must be activated to support educational projects involving several classrooms, or school transversal working groups, or activities with the community. Also, the teacher/educator will design for learning to generate learning activities, use of resources, and enhance classroom relationships that nurture the students’ learning ecologies.
- **Analysing progress and final impact.** Beyond complex statistical analysis and data visualization (that can be considered resources indeed), the same approach to visual and narrative mapping can be used. The maps can be built either in the classroom or across working groups, taking into consideration particularly how the “poor” areas were enriched and which was the impact on learning in relation to the specific domain.

Applying the lifelong learning ecologies to develop critical digital literacies

Despite the digital technologies have generated innumerable opportunities to develop skills for future social, cultural and economic scenarios, their use is nowadays generating several concerns (Sancho-Gil, Rivera-Vargas, & Miño-Puigcercós, 2020). Twenty years of research on the adoption of educational technologies and technologies overall have led to the understanding that “techno-enthusiasm” might only lead to dead ends in the best of scenarios (Selwyn, 2014). In the worst of cases, and particularly in the COVID19 aftermath, issues as social exclusion due to the lack of access to appropriate devices and facilities; lack of ergonomics and impact on children and young people physical and mental health; technology overexposure, dependence, and burnout; students’ data surveillance and data monetization, to mention but a few, have been discussed on the light of critically reconsidering technology-enhanced pedagogies (Manca, Persico, & Raffaghelli, 2021; Williamson, Eynon, & Potter, 2020).

Such a situation requires not only careful educational research and policymaking but particularly a change in the direction of teachers' professional development. For almost three decades in the EU, policies have focused on the development of technical abilities and an only recently the concern about an integrated vision relating the "digital competence" (Carretero, Vuorikari, & Punie, 2017) and the educators' professional digital competence have evolved (Redecker & Punie, 2017). However, the current situation is claiming for approaches and projects that encompass the development of teachers' awareness and professional skills to support their students' critical literacies (Pangrazio, 2016).

Hence, our approach promotes mapping, visualising, nurturing/developing, and analysing the progress of learning ecologies relating to critical digital literacies.

In the following, you will find an exercise that might help in this direction.

Exercise I: The Learning Ecology's Map

The starting point is to understand what Critical Digital Literacies are, and in this regard, we can count on a learning resource where Edul@b contributed: the CDL framework (Gouseti et al., 2021).

Access directly through this link: <https://zenodo.org/record/5070329#.YZUHDdCZOUk>

STEP 1 – THE PERSONA: a need's analysis narrative for action-taking.

Sandra is invited to contribute with her professional expertise for a MOOC aimed at other teachers. *Here is an exercise to start thinking about how to package her learning ecology.*

Take a look at the table: it represents a narrative account of Sandra's thoughts around how she experiences some critical uses of technologies and how she searches for help to learn. Within the table, there are positive and negative signs, relating positive and negative "forces" within the persona's learning ecology's map.

| | |
|--|--|
| <p>My past experience</p> <p>+Field Knowledge</p> <p>+Experience -> Focus on the problem</p> | <p>I have been working with kids of 11-13 years old for the last fifteen years. Along my experiences as teacher, online tutor, teachers' trainer, education coordinator and even project manager, several times it came to my mind that technologies can trigger creativity, but they can also hurt.</p> <p>I have seen many bad examples of addictive videogames, hate speech at social networks, or continuing distraction triggered by the mobiles. Nowadays, privacy is also a huge issue. I have been working with my students on experimental activities around some of these topics. How could I disseminate this knowledge to allow other teachers to use it? Before starting with interventions from scratch, I'd like to see what's out there.</p> <p>Where to start?</p> <p>Clearly, I have interesting materials, but how could I deliver them to other teachers?</p> |
| <p>+ Institutional attention</p> <p>+Opportunity to discuss.</p> | <p>Introducing the context! Nobody could understand why what I do worked well, if I do not present the context of my intervention.</p> <p>At an institutional level, where I work, awareness is rising, and the topic of hate speech is becoming an issue to be discussed. There have been a couple of complicated cases of groups of kids hacking and ruining other groups' pages on Instagram and bad comments at TikTok. The overall context of a society that needs to be more literate around social media, including proneness to understand where the quality information is and how it is used, as well as avoiding fakes and discourse polarization, creates a window of opportunity that I deem relevant for my school community.</p> |
| <p>+ Positive trend within the professional community of teachers/educators.</p> <p>- Lack of clearness in the definitions and examples provided</p> | <p>The ongoing debate: what triggered my attention, what were the difficulties I had to overcome.</p> <p>Moreover, there was much debate when the film The Social Dilemma came out... Many colleagues used parts of that film or had been already reflecting with the students using another interesting edutainment resource, the Black Mirror series at Netflix.</p> <p>However, including relevant and accessible content at school relating to this issue is not easy. We must consider the contexts. The Social Dilemma of Black Mirror sometimes use examples that are a bit exaggerated or are not representative of the realities my kids live at home. They are not accessible for children of 11-13 years old. We need to build stories that they feel and work them out also across the specific subjects at school.</p> |
| <p>(-) Community knowledge not advanced</p> | <p>Regarding the institutional contexts and the colleagues with whom I interacted seemed to be better informed on the problem of information literacy but less on the issue of the literacies to critically interact with social media. I felt in the position of taking action, and here I'm proposing spaces to reflect on the issue.</p> <p>Another teacher should consider if there is a need or there are already existing resources or projects before starting.</p> |

| | |
|---|--|
| <p>(-) professional constrains</p> <p>(-) curriculum constrains</p> <p>(-) professional skills</p> | <p>In many conversations with colleagues, I have reflected on the difficulties cultivating a critical digital literacy imposes: I need to agree with other colleagues to generate projects that make sense at school as the specific context of learning; the topic it's not fully integrated into the curriculum, it is not a mandatory topic; the design from scratch of learning modules are time-consuming and go beyond our subject field; last but not least, reusing/adapting other learning modules is not always feasible.</p> <p>Another teacher must be aware of the situation at their schools to think about the type of activity they would like to implement: a small classroom activity, or a more complex project.</p> |
| <p>(+) Available resources</p> | <p>However, more and more tools are being offered, as the critique around Social Media is finding more and more space in society. There are many free webinars to discuss the issue, and the Open Educational Resources generate opportunities to discuss educational designs at school and with parents.</p> <p>I should think about the existing resources that could be reused.</p> |
| <p>(+) Tools' used: Movies, Blog, Learners' Generated Content</p> <p>(+) Envisaged tools: Digital Libraries, Open Educational Resources, websites</p> <p>(-) Too much resources can overload others!</p> | <p>As tools, I started to use popular movies and Netflix series like 13, the Black Mirror and lastly, the Social Dilemma. I created a website with WordPress where my students collaborated as content creators with their activities (learners' generated content) I also generated my own set of rubrics to evaluate my students' progress. I even implemented a students' log to tell their experience and my own diary to recall all my actions.</p> <p>I could use existing libraries and OER in future experimental activity. Even if I did not do it the first time, I could search, curate and propose that to other colleagues.</p> <p>However, I need to present all in a systematic way. The colleagues that are new in the topic will have to get informed first, understand, explore and hence adapt to their own classes. Let's keep it simple!</p> |

Table 2 - Sandras's PERSONA, representing her learning ecology

STEP 2 – DESIGNING THE LLE MAP: a sketch on the positive and negative forces shaping the field of action.

Now take a look at figure 3.

- There is one inner circle, what you can do/activate or what affects you directly
- An external circle, relating what you can get from close relationships or what you cannot control in the closer circles.

- There are “entering circles” of opportunities and risks about what you can do.



Figure 3 - Sandra's sketch on her learning ecology, after the narrative “persona”

STEP 3 – SKETCH YOUR OWN LLE MAP.

Now you saw Sandra's PERSONA and the sketch of her learning ecology, let's do the exercise about you.

A- Think about your own narrative.

The right column suggests contexts and situations that enforce or weaken your possibility of designing for other colleagues to learn about your experience. You should add a (+) or (-) sign taking into consideration whether the forces are positive or negative.

Within the left column, you can annotate your narrative. You can list a couple of key terms, or you can tell your story.

As knowledge domain, select one of the dimensions or subdimensions of the Critical Digital Literacy Framework.

THE TOPIC: _____

| | |
|--|--|
| <p>My past experience and current knowledge</p> <p>[IDENTITY]</p> | |
| <p>My institutional context</p> <p>[CONTEXT]</p> | |
| <p>The trends in my professional community</p> <p>[CONTEXT]</p> | |
| <p>My colleagues' opinion & practices</p> <p>[RELATIONSHIPS]</p> | |
| <p>My professional development</p> | |

| | |
|---|--|
| opportunities & constrains [RELATIONSHIPS] | |
| My available resources [RESOURCES] | |
| The tools I use and the tools I could use [RESOURCES] | |
| What I'm doing [ACTIVITIES] | |
| My activity plan [ACTIVITIES] | |

B- Sketch your learning ecology Map (you can take a look at Sandra's Map or try your own approach) and compare it with others!

C- Aggregate your results and find out where the "rich" and "poor" areas requiring intervention can be found.

Exercise II: The school as a learning ecosystem

If you take a look at the several learning ecologies, you will come to see that there are areas where the resources, activities and good connections/relationships abound. It will be easy to learn around the topic where the learning ecologies converge.

Instead, there will be areas less covered. These are the areas requiring strategic planning, common efforts like projects or experimental activities, and group working.

Use the following table to synthesis the areas of convergence and divergence.

| Relationships | Activities | Resources |
|---|--|---|
| Which relationships (internal and external) are promoted in the educational institution? | In which activities to promote continuous professional development is the institution involved? | Which resources are available for the educational community? |
| <i>For instance: Teachers' groups, other educational institutions, associations, partnerships, enterprises, professional networks. An how are they held? virtually, f2f?)</i> | <i>For instance: Activities promoted by the institution (internal training, mentoring and dissemination activities, visits of experts, participation in activities that are organised by others such as conferences, workshops, online, that can be developed f2f and blended activities.)</i> | <i>Resources such as: - Infrastructures and equipment - Content repositories - Digital tools - Online Training and learning resources</i> |

Once you did this exercise with other colleagues, working group, or through a workshop at school, establish the priority actions. The areas of the school ecosystem where there is plenty of resources, activities and relevant relationships could be of help to make a start.

You should evaluate the complexity of nurturing the school ecosystem from one of the "poor" areas. Can you liaise with the "rich areas"? If not, which are the possibilities to act?

Establish a way for the other teachers to arrive at "rich areas", by sharing information, generating spaces of reflection or self/peer-training.

Use tools relating to project management to support your planning strategies or implementing projects. For example <https://hygger.io/guides/agile/agile-vs-waterfall/>

Once you have established a plan at the school level, use the same tools proposed at Exercise I and II, at the end of the school year: explore and compare how the learning ecologies have been nurtured and how the school as an educational ecosystem became healthier and more prosperous!

References

- Barron, B. (2004). Learning Ecologies for Technological Fluency: Gender and Experience Differences. *Journal of Educational Computing Research*, 31(1), 1–36. <https://doi.org/10.2190/1N20-VV12-4RB5-33VA>
- Bateson, G. (1987). *Steps to an Ecology of Mind. Collected essays in anthropology, psychiatry, evolution, and epistemology. Steps to an Ecology of Mind. Collected essays in anthropology, psychiatry, evolution, and epistemology.* <https://doi.org/10.2307/446833>
- Bozkurt, A., Jung, I., Xiao, J., Vladimirschi, V., Schuwer, R., Egorov, G., ... Paskevicius, M. (2020). A global outlook to the interruption of education due to COVID-19 Pandemic: Navigating in a time of uncertainty and crisis. *Asian Journal of Distance Education*, 15(1), 1–126. <https://doi.org/10.5281/zenodo.3878572>
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design.* Cambridge, MA.: Harvard University Press.
- Carretero Gomez, S., Napierala, J., Bessios, A., Mägi, E., Pugacewicz, A., Ranieri, M., ... González Vazquez, I. (2021). *What did we learn from schooling practices during the COVID-19 lockdown?* Luxembourg. <https://doi.org/10.2760/135208>
- Carretero, S., Vuorikari, R., & Punie, Y. (2017). *The Digital Competence Framework for Citizens With eight proficiency levels and examples of use.* Brussels. <https://doi.org/10.2760/38842>
- CORE Education - Tatai Aho Rahu. (2018). Learning Ecologies. Retrieved November 15, 2021, from <https://core-ed.org/research-and-innovation/ten-trends/2018/learning-ecologies/>
- Esposito, A., Sangrà, A., & Maina, M. (2013). Chronotopes in learner-generated contexts. A reflection about the interconnectedness of temporal and spatial dimensions to provide a framework for the exploration of hybrid learning ecologies of doctoral e-researchers. *ELearn Center Research Paper Series*. Retrieved from <http://journals.uoc.edu/index.php/elcrps/article/view/1868/n6-esposito-ePub>
- Esposito, A., Sangrà Morer, A., & Maina, M. F. (2015). Emerging learning ecologies as a new challenge and essence for e-learning. The case of doctoral e-researchers. In M. Ally & B. Khan (Ed.), *Handbook of e-learning* (pp. 331–342). NY: Routledge. Retrieved from <http://openaccess.uoc.edu/webapps/o2/handle/10609/41561>
- Gouseti, A., Bruni, I., Iloäki, L., Lakkala, M., Mundy, D., Raffaghelli, J. E., ... Romeu, T. (2021). *DETECT - DEveloping TEachers' Critical digital liTeracies.* <https://doi.org/http://doi.org/10.5281/zenodo.5070329>
- Gutiérrez, K. D., Bien, A. C., Selland, M. K., & Pierce, D. M. (2011). Polylingual and polycultural learning ecologies: Mediating emergent academic literacies for dual language learners. *Journal of Early Childhood Literacy*, 11(2), 232–261. <https://doi.org/10.1177/1468798411399273>

- Haythornthwaite, C., & Andrews, R. (2011). e-learning ecologies. In *E-Learning Theory and Practice* (pp. 143–160). London, UK: SAGE Publications Ltd. <https://doi.org/10.4135/9781446288566.n9>
- Jackson, N. J. (2013). The Concept of Learning Ecologies. In E. & P. D. e-book Lifewide Learning (Ed.), *Lifewide Learning, Education & Personal Development e-book*. Work based in UK. Retrieved from http://www.lifewidebook.co.uk/uploads/1/0/8/4/10842717/chapter_a5.pdf
- Jackson, N. J. (2019). *A guide to Mapping Ecologies of Practice for Learning, Creativity & Performance at Work*. Retrieved from https://www.learningecologies.uk/uploads/1/3/5/4/13542890/guide_to_mapping_an_ecology_of_practice.pdf
- Kop, R., & Fournier, H. (2010). New Dimensions to Self-Directed Learning in an Open Networked Learning Environment. *International Journal of Self-Directed Learning*, 7(2), 1–20. Retrieved from <http://sdlglobal.com/IJSDL/IJSDL7.2-2010.pdf#page=6>
- Krumsvik, R. J., Jones, L. Ø., Øfstegaard, M., & Eikeland, O. J. (2016). In or Out of School? - Meaningful Output with Digital and Non-digital Artefacts within Personal English Learning Ecologies. *Nordic Journal of Digital Literacy*, 10(03), 165–184. <https://doi.org/10.18261/issn.1891-943x-2016-03-03>
- Lai, K.-W., Khaddage, F., & Knezek, G. (2013). Blending student technology experiences in formal and informal learning. *Journal of Computer Assisted Learning*, 29(5), 414–425. <https://doi.org/10.1111/jcal.12030>
- Maina, M. F., & González, I. G. (2016). Articulating Personal Pedagogies Through Learning Ecologies. In B. Gros, Kinshuk, & M. Maina (Eds.), *The Future of Ubiquitous Learning* (pp. 73–94). Hershey: IGI-GLOBAL. https://doi.org/10.1007/978-3-662-47724-3_5
- Manca, S., Persico, D., & Raffaghelli, J. E. (2021). Emergency Remote Education: methodological, technological, organizational and policy issues. *Italian Journal of Educational Technology, online fir*. <https://doi.org/10.17471/2499-4324/1251>
- Morer, A. S., Raffaghelli, J. E., González-Sanmamed, M., & Muñoz-Carril, P. C. (2021). Primary school teachers' professional development through the learning ecologies lens: new ways for keeping up to date in uncertain times. *PUBLICACIONES*, 51(3), 21–70. <https://doi.org/10.30827/PUBLICACIONES.V51I3.20790>
- Pangrazio, L. (2016). Reconceptualising critical digital literacy. *Discourse*, 37(2), 163–174. <https://doi.org/10.1080/01596306.2014.942836>
- Redecker, C., & Punie, Y. (2017). *European Framework for the Digital Competence of Educators: DigCompEdu. Joint Research Centre (JRC) Science for Policy report*. <https://doi.org/10.2760/159770>
- Romeu-Fontanillas, T., Guitert-Catasús, M., Raffaghelli, J. E., & Sangrà, A. (2020). Mirroring learning ecologies of outstanding teachers to integrate ICTs in the classroom. *Comunicar*, 28(62). <https://doi.org/10.3916/c62-2020-03>

- Sancho-Gil, J. M., Rivera-Vargas, P., & Miño-Puigcercós, R. (2020). Moving beyond the predictable failure of Ed-Tech initiatives. *Learning, Media and Technology*, 45(1), 61–75. <https://doi.org/10.1080/17439884.2019.1666873>
- Sangrà, A. (2015). Ecologías de aprendizaje a lo largo de la vida: Contribuciones de las TIC al desarrollo profesional del profesorado - Proyecto ECO4Learn. Retrieved from <https://eco4learn.wordpress.com/>
- Sangrà, A., Raffaghelli, J. E., & Guitert-Catasús, M. (2019). Learning ecologies through a lens: Ontological, methodological and applicative issues. A systematic review of the literature. *British Journal of Educational Technology*. <https://doi.org/10.1111/bjet.12795>
- Selwyn, N. (2014). *Distrusting educational technology : critical questions for changing times* (Routledge). London.
- Siemens, G. (2008). New structures and spaces of learning: The systemic impact of connective knowledge, connectivism, and networked learning. In *Encontro sobre Web 2.0*. Braga, Portugal: Universidade do Minho. Retrieved from http://elearnspace.org/Articles/systemic_impact.htm
- Williamson, B., Eynon, R., & Potter, J. (2020, April 2). Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology*. Routledge. <https://doi.org/10.1080/17439884.2020.1761641>