Scenario III. 1,000,000

This scenario is important as cultural diversity is a reality in Luxembourg. Already in 2015, Luxembourg's population growth and diversity is world-wide absolutely unique. Language disparities, socio-economic inequalities and different visions challenge social cohesion and integration.

The scenario exacerbates the current situation of immigration and high population growth rate to discuss uncertainties, taboos and expected challenges to come. The educational system is totally transformed to maintain social coherence and offset unavoidable social tensions, largely at the expense of traditional learning. The school as we know it has given way to the "community hub", which offers integrated health, wellbeing and learning services to children and families of all backgrounds.

The multicultural community hubs are integral part of a consolidated municipal life, with a mixed voluntary/mandatory participation of all citizens and local corporates, the main goal of which are social integration and cohesion. The Government maintains the "Luxembourg On-line Learning System" as platform for self-paced and coached learning.

Societal developments confront the citizen with a demanding political and social agenda that does not allow them to shirk from their civic obligations. Reactions of citizens and communities are difficult to predict but the best one can say is that they are mixed.

The scenario fails by all sustainability criteria, since physically speaking, population growth cannot and will not continue indefinitely. Thus, this scenario describes a relatively short transition period in Luxembourg's history. While this period may end already during the thirties, it will transform our society in an unprecedented way. How Luxembourg will be in 2030 and beyond, is still for us to decide!

Contents

1. The world in 2030

Alas! The world is not at peace. Demographic development, climate change and resource scarcity, have resulted in acute social tensions and geo-political instability across the globe. Regional conflicts have triggered mass migrations. Europe is still a safe haven with an aging society, highly attractive to scores of migrants and refugees. By 2030 Europe's population is highly diverse by all standards and strong policies for cohesion are enforced

Information and communication technologies (ICT) consolidate and revolutionize the way humans interact and think, in three different ways.[1] First, societies develop new and diverse ways to organize and mobilize themselves horizontally into networks, by-passing the traditional vertical structures of control. This can create social tensions and war. Second, big data gives huge power to whoever has access to it. This "big brother" has a positive and negative side. On the positive side, it allows real time accurate statistics regarding the society, the economy and the environment. On the negative side, it raises huge concerns in terms of privacy rights and human rights in general. Third, the information and communication technologies drive the transformation of the traditional educational system.[2]

The revelations of Edward Snowden in 2013 uncovering the extent of espionage and massive recompilation by the US intelligence of citizen's information all across the globe have a deep impact on governmental cybersecurity. Many countries accelerate their pace towards an "arms race" of counterespionage and data protection technology. The EU have the infrastructure and the resources to compete in this race and by 2030 it is a safe haven of information—with its headquarters in Luxembourg.

1.1. Geopolitical issues, demographics and migration

Resilience and vulnerability are correlated with wealth and social stability. Europe, North America and Australia are the regions with the highest adaptive capacity and the best disaster risk management in 2013.[3] Despite only limited natural resources, Europe was able to reduce its dependence on foreign suppliers to sub-conflict levels by focusing on renewable energy[4] and by investing heavily into recycling technologies. A mutually beneficial partnership with energy- and resource-rich Russia largely fill the remaining gaps. Thus, compared to most of the world, Europe remains mostly unthreatened by resource scarcity. Europe was also successful at offsetting the impacts of climate change. The European Union was applauded world-wide for its farsighted climate policy, despite its only limited vulnerability to climate change.

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[1] The Conference Board (2011) The Linked World: How ICT is Transforming Societies, Cultures, and Economies. Visited at: http://www.conference-board.org.

[2] Zhao, Hong (2011) Introducing ICT in a Traditional Higher Education Environment. In: Lin, Song and Huang, Xiong (eds.) Advances in computer science, environment, ecoinformatics, and education. : International Conference, CSEE 2011, China, August 21-22 2011. Part III. Pp.129-132.

[3] The assessment considers the infrastructure, legal mechanisms and social awareness and education of the population and the government. The green color represents countries at low risk and red those at high risk.

[4] Progress report of the EU Commission on Renewable Energy : http://ec.europa.eu/energy/renewables/reports/reports_en.htm

Fig. 1.1 Global map of disaster risk management and adaptive capacity by country, 2013
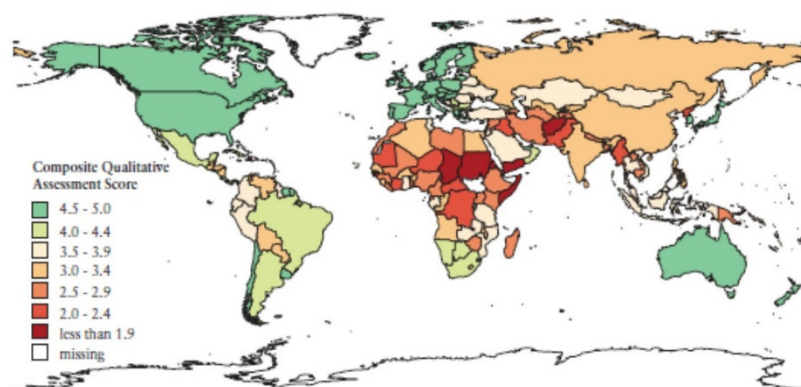
Source: ODI, UK Met Office and Risk Management Solutions (2013) The geography of poverty, disasters and extreme climate in 2030, Figure 1.1.

Europeans are still able to enforce law and order, and maintain a safe haven in an increasingly turbulent word. Europe's long historical record of mediating cultural differences has become its prime asset. As a result, the geopolitical instabilities that send waves across the world have not shaken its foundations. But the world is also changing at a rapid pace for Europe and its shifting partnerships.

Europe and US. In the 2020s, the rift that started after 9/11 2001 to alienate Europe from the US becomes increasingly obvious. While during the 2010-20 policy makers could still largely ignore the trend, in the 2020s it was increasingly reflected in mainstream policies between the 2 block. True or perceived differences in political, social, philosophical, religious and economic perceptions drove this rift. To name just a few: differences in attitudes towards military interventions, the international court of justice, energy and sustainability policies, public transportation and other "green" policies (genetically modified organism, biodiversity...), protection of consumers versus multinationals (TTIP), social and health care policies, role of government versus private responsibilities, religion, etc. The financial crisis that crippled the Mediterranean Belt Countries (MBC) of the EU until well into the 20ies was increasingly blamed on the US. TTIP and its legal instruments became the symbol of transatlantic supremacy. In the Ukraine, US hardliners did little to appease the conflict and US policy continued to nurture Turkey's aspirations to join the EU even after it turned towards a partnership with its Middle Asian neighbors. As a result of huge opportunities for hydraulic fracturing ("fracking"), solar energy and with the huge shale oil reserves, the US became largely energy-independent, while Europe endorsed a path of energy saving, and reliance on alternative energy sources and mainly Russian gas.

Population growth and poverty, disasters and extreme climate have taken their toll across the world. By 2030, Europe has been subject to numerous large waves of non-EU migration.

Europe and the Middle-East/Northern Africa. The Arab Spring protests and revolutions[5] that began in 2010 across the Middle East and North Africa as democratic uprisings had little positive outcome: general regional instability, civil wars that mostly culminated in more or less enlightened dictatorships, and millions of refugees. Sectarian violence in many countries with a sizeable Muslim population sparked scores of refugee waves heading for Europe. While the "Islamic State" and other extremist movements did not succeed in conquering territory in the Middle East, they succeeded in flooding Europe with refugees of all denominations. By 2030 most European countries have large and self-confident Muslim communities, eager to fill the religious vacuum left by

[5] Arab spring: an interactive timeline of Middle East protests: http://www.theguardian.com/world/interactive/2011/mar/22/middle-east-protest-interactive-timeline

secularization of Western societies, benefiting from European tolerance and values. Demographically, they outrun each other and the autochthonous populations in fertility rates. Sectarian Muslim conflicts undermine societal cohesion in some European countries.

Palestine and Gaza are de facto independent states. Israel has a large Arab population; Palestine has a large Jewish population. But the conflict continued to linger since Palestine refused to give citizenship to Palestinians from the different UNWRA (United Nations Work and Relief Association) fields. UNWRA was eventually dissolved and the United Nations High Commission for Refugees (UNHCR) took responsibilities for all refugees in the world including in the Middle East (and the Palestinians). As result, refugee status and all benefits were no longer heritable for generations to come and Palestinians lost their privileged and world-wide unique refugee status. Palestinians acquired citizenship in the countries where they lived since decades and several generations. Descendants of Palestinian origin who lose citizenship of their country of residence are no longer eligible for UNWRA refugee status.

Turkey and Middle Asia. The Kurds' success against the "Islamic State" nurtured new national aspirations and instability in Turkey's Eastern Provinces and new military conflicts in its Eastern neighbor countries. Turkey's heavy-handed ethnic policy and its open borders for refugees to transit to Europe sends waves of migrants to Western Europe. While a secular middle class and middle level Government officers in Turkey continued to aspire to an EU membership even until the 2020ies, the leadership in concert with the majority of the population have turned their back on the EU already at the beginning of the second decade. Islamisation of all aspects of life and most institutions, including schools and universities, the deteriorating status of women and minorities, and the unabated undercover support for radical Islamic movements in neighboring countries, alienated the EU. Turkey was no longer to be perceived as a model of a modern secular Islamic State. As the consequence of a politically encouraged accelerated growth, by 2030 Turkey's population largely outnumbered even the largest EU countries or the combined population of the 20 smallest EU member states: the largest EU country was going to be in Asia. Demographic and geographic considerations, the continuing occupation of Northern Cyprus, border tensions with most of its neighbors, the lack of cooperation to control its borders with the EU, and its economic support for the Crimea Peninsula after its "annexation" by Russia prompted the EU to officially discontinue membership negotiations by 2018. A privileged partnership was offered instead and the EU provided technical and political support in Turkey's effort to establish a Commonwealth of Turkistan as a first step towards economic and political union with the Caucasian and Middle Asian Islamic countries, the former Soviet Republics.

Europe and Africa. Migration waves come in particular from Africa, where excessive fertility rates paired with low child mortality drive the population growth beyond 1.5 billion by 2030. Most African countries have become dependent on foreign food aid. During the early 20ies, Sub-Saharan Africa becomes increasingly the stage for a variety of local interreligious, sectarian and francophone/anglophone proxy conflicts, that are fueled by pricy metals ores and other minerals, (industrial diamond, cobalt, bauxite, platinum-group metals, iron, cooper, coltan), and vast oil and gas reserves, that are too precious to share.[6] To stem demographic growth, a new concept, the Population Development Grid (PDG), developed by the United Nations, provided internationally binding upper limits for population density and growth based on complex socioeconomic, ecological and geographic models. By 2025, foreign aid became increasingly dependent on demonstrated demographic responsibility and demonstrated compliance with the PDG of the recipient country. At first, this international policy tended to exacerbate the situation in Africa but in the thirties the demographic and socioeconomic benefits became recognized.

Europe and Russia. The 2014/15 crisis in the Ukraine and the 2015/16 crises in Moldavia over Transdniestria have taught the EU the lesson that further extending to the East will meet with Russian sensitivities and more importantly military resistance. Mutual boycotts highlighted mutual interdependence and a de facto partnership. In 2016, Russia started The Siberian Strategic Development Program (SSDP) including the extension of its gas pipelines from Siberia to the industrial hubs of North Eastern China and a high-speed, high-capacity cargo train connection linking China with Europe. The SSDP took full advantage of the pivotal location of the country between Europe and China, providing Moscow unprecedented economic leverage over both of its neighbors.

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[6] Tensions between US and China over Africa: http://www.theguardian.com/world/2014/aug/05/obama-africa-leaders-us-china-investment-summit.

With Russia's civil economy strengthened, the military industrial complex lost political influence. The SSDP was largely co-financed by the EU. This new partnership was further driven by two very strong common interests: Russia was a huge and hungry market at the door step of the EU, and the EU was more than willing to supply this market. In return, Russia provided what the EU needed most: energy and mineral resources. By 2017, the recognition of each other's interests has led to a true partnership at equal eye level, compliant with Russian geopolitical sensitivities.

Europe and the Americas. Civil unrest extends across Central and South America and many try to make their way to North America and Europe. In particular, a permissive immigration policy of Portugal sends scores of migrants from Brazil to Luxembourg.

Europe is not without its own social problems. After the austerity measures of 2011, citizen movements and protests developed in the Mediterranean Belt Countries. Direct involvement of citizens and advocacy groups increases since the EU and national Governments introduced provisions for online voting, and direct citizen proposals, to promote consensus and participation of the civil society. After decades of political and even military interventions at its door-step that left most of its neighbor countries from the Black Sea, to the Near/Middle East and Northern Africa on fire, in the twenties Europe draws on its long history of cultural negotiation to become a voice for peace in a turbulent world. The outcome is a strong EU that maintains a low profile in international conflicts but a strong immigration policy with the EU Blue Card Scheme[7] and the EU (fast-track) citizenship program[8] and a stable economy. Immigration is welcomed in an ageing European society. Guidelines for a successful application for international protection are freely available on the internet.

Fig. 1.2 Demographics of the World by 2030
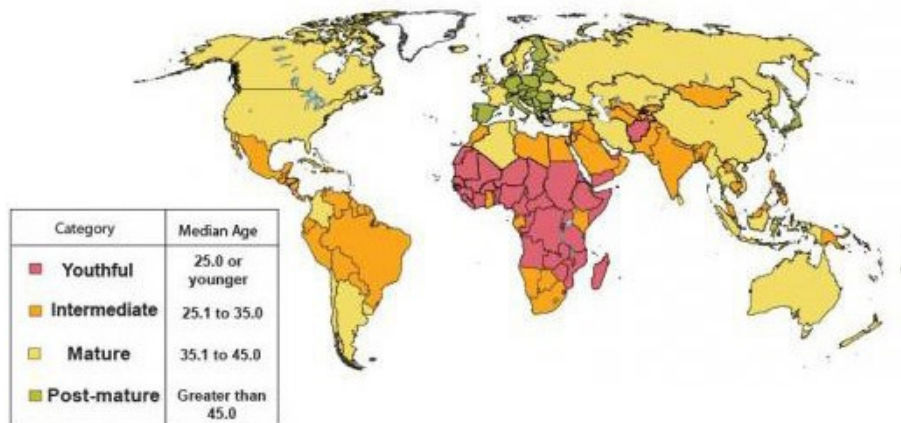
Source: National Intelligence Council of the US, Global Trends 2030, visited at http://gt2030.com/.

Europe seeks to attract high levels of immigration from youthful high net worth educated individuals fleeing the global geopolitical tensions. However, in an undeclared effort to mend its demographic deficits, the definition of refugee becomes increasingly permissive to include large categories of environmental, economic or otherwise deprived migrants. Unbalanced global news coverage of the EU open-door policy, save-and-rescue operations in the Mediterranean, and pictures of welcomed refugees were seen by millions as implicit invitations to start a new and better live in Europe. Unrealistic expectations mobilized hundreds of thousands at the door-steps of Europe, from Africa and the Middle-East to march towards preferred countries in the EU. As a result, already during the second decade socioeconomic activities of whole communities and swathes of land succumbed to emigration further accelerating their degradation. Concerns of many developing countries about losing their best hands and brains (brain drain) and wealth (wealth drain) through emigration to Europe became a matter of increasingly fierce disputes with developing and middle income countries. The help-yourself attitude for human

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[7] The EU Blue Card Scheme attracts highly educated immigrants who are entitled to working and salary conditions equal to nationals with a series of socio-economic rights and permanent residence perspectives.
[8] The EU (fast-track) citizenship program attracts high-net worth individuals to invest in Europe.

resources, prevalent during the past decades is increasingly questioned. By 2020 traditional advocates of migration such as human rights movements and other activist's groups have turned away from the individual plight of the immigrant to look at the impact of the emigration in the countries of origin. These same groups that enthusiastically welcomed refugees, now scourge a migration policy in Europe that helps itself for human resources across the world, to solve its demographic and economic human resource problems at the detriment of developing countries.

1.2. Global leadership and power distribution across governance levels

Global leadership has lost relevance and financial support, as international organizations failed to reach solutions to major world problems. The track record of the United Nations, the Organization of Security and Cooperation in Europe and others is one of imbalanced interventions and missed opportunities. In general, the US, China and the EU are the strongest powers across the globe. However, all are bugged down with internal social tensions and disruptions. There is a familiar pattern of social tensions, standoffs, conflict and poverty across much of the world. Security concerns strengthen the defense industry (low intensity warfare, cyber warfare, drones and protection of borders) and across the world, there is a growing arms race, heightening tensions, and leaving many citizens feeling vulnerable in a dangerous world.

The US confronts a constitutional crisis due to intractable political differences between the major parties, struggling to reconcile vastly disparate views on foreign policy, environmental and sustainability issues and trying to confront a health crisis, caused by obesity and unaffordable costs for war veterans.[9] The growing inequalities and divisions can no longer be ignored. Despite several fracking and oil disasters, the US has become self-sufficient with respect to energy and other natural resources. After the crippling frustrations that started in Vietnam, and continued in Iraq, Afghanistan, Somalia, and other wars, the burden of a global strategy is no longer supported by a population which turns to its own priorities. American policy makers are also disillusioned by a EU that turns towards a more democratic post-Putin Russia for a strategic partnership, based on mutual interdependence as a major driver of policy. All these developments played into the hands of a neo-isolationists population, who was no longer willing to provide the enormous resources for more international interventions.

In the Pacific, the US and China have a short military stand-off, but China's influence quickly out-runs the US in the region. China successfully projects its power across the Asia-Pacific region and beyond. During the twenties, the country is confronted with major environmental disasters ranging from air pollution to cancer villages that leave behind vast uninhabitable regions and setbacks to its economy.[10] As a result China makes major progress in governance and citizen participation and rights. Since, the country refrains, as a matter of policy, from imposing its own views on others, it became a preferred partner for many countries irrespective of their human rights records.

Europe, with its extreme cultural diversity understands the need for clarity and cooperation. With the EU Constitution of 2018, the EU promotes transparency and equality. There are strong controls together with a clear frameworks for negotiation and enforcement. In 2030, Europe is perceived as a stable region and a safe haven by many who live in a more turbulent world. However, social tensions due to the diverse cultural immigration of the last 20 years are on the rise. Europe's human rights record is unparalleled, particularly after the successful decree of the EU constitution. The EU retains six exclusive competences, namely: intrastate competition rules of markets, the customs union, the monetary policy, the conservation of marine biological resources, common commercial policy, and certain limited international agreements. Another strength – and liability - of Europe lies in the direction of common foreign and security policy. However, most attempts to proselytize for human rights, self-determination of people, democracy, and integrity of borders became entangled in contradictions and meet

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[9] Obesity crisis in the US : http://www.forbes.com/sites/alicegwalton/2012/05/11/why-the-u-s-may-go-broke-over-the-obesity-crisis/

[10] China's environmental disasters: http://www.businessweek.com/articles/2014-03-13/china-wakes-up-to-its-environmental-catastrophe

with failure. Double standards in policy further undermined the stability of virtually all its neighbors in North-Africa, the Middle East, Middle Asia and Eastern Europe. As a result waves of refugees from these countries seek refuge in Europe. Thus, the protection of borders and immigration management is a major concern in most EU countries.

Being European does not negate national identity: this is important to the extent that it represents certain lifestyles, cultural values, languages, and tastes and adds to Europe's rich cultural and political heritage. Citizen's organizations independent of political parties are capable of mobilization and proposing independent solutions in the EU. They compete in terms of lobbying with other stakeholders. The citizen body for monitoring big data is formalized in the EU.

1.3. The global economy and free trade

In 2030, economic growth and free trade are driven by the US, China and the EU. As a result of TTIP US-EU trade product and service standards and to some extend even social standards, become accepted norms word-wide. The global economy neither strives nor declines, it barely maintains itself. Alternative energy technologies, information and communication technologies, and health and food technologies are the object of free trade.

Reforms of European financial markets are driven by a consensus for more regulation, and control by citizen bodies. New structure, are based on big data, sophisticated yet transparent security systems, clear rules and adequate oversight by citizen bodies. Each of the EU countries focuses on its internal economic strengths with the struggling Mediterranean Belt Countries being supported by their stable Northern neighbors. Despite continuing support, the national debt of Greece increased relentlessly. In 2016, the EU and Greece mutually agreed that a return to a soft currency and an economy based on tourism, agriculture and minimal importations are the only way to revive a suffocating country. With the banking union completed, Greece leaves the Euro with only minimal turbulences. With EU regional funds and Germany's expertise, the Hellenic Eolian and Solar Energy Program, transforms Greece into the primary EU producer of renewable energy and a net exporter of electricity. The country imports Cypriote offshore gas and is essentially independent of crude oil imports. By 2030, Greece is a primary stakeholder with an own emerging industry in alternative energy.

2. Luxembourg in 2030

2.1. Society

For several decades Luxembourg has been is one of the most attractive magnets within Europe. As a result Luxembourg's population grew between 1960 and 2012 from 313050 to 524853, corresponding to a population growth of 68% compared to 24% in the EU and 13-40% in the neighboring countries. Since 1985 population growth accelerates continuously[11]. Between 2000 and 2012 Luxembourg grew by 21% (EU by 4%). With more than 2.3%, Luxembourg's annual population growth is the highest in Europe and among all developed countries; all other European countries are below 1% annual growth and the EU average (0.25%) is even 10 times lower. By 2020 the net migration balance is 5 times as high as in any other EU-27 country. The population density grew from 216 population per km^2 in 2014 to more than 400 by 2030, when the 1000.000th resident was welcomed in Luxembourg. Of the 1,000,000 population [12] at least 50% are first generation residents. To make room for all, a booming construction industry that in the 2010s already consumed 7 km^2 of new land per year, by 2030 seals almost three times as much land or 0,8% of the national territory, every year. Thus, net immigration into Luxembourg is world-wide unique by all standards! However, the schools have to sustain a population of newcomers that is more than twice as high (as the net population balance) because of 50% of newcomers leave the country again within the first 2 years.

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[11]   Population growth rate : http://www.wort.lu/en/luxembourg/luxembourg-s-population-growing-at-fastest-rate-in-70-years-4ffd7f88e4b096b452e28e9a

The issue of the origin of Luxembourgish citizens is a key concern[13]. In 2014, only one-third of citizens can be described as native Luxembourgish, i.e. three generations of descendants who come from Luxembourg. By 2030 more than half of the inhabitants of Luxembourg have to be assimilated and integrated into an already extremely multicultural society.

Immigration from Europe, Africa, the Middle-East and Asia were powered by various push factors, but in all cases Luxembourg's relative economic prosperity, its accessible social security and health system, its multicultural society and in the late 20ies the unconditional basic salary for all citizens were important pull factors. While Luxembourg tries to attract highly educated, middle- and upper-class foreigners, population growth is largely due to immigrants with strong educational and socioeconomic handicaps. Immigration into Luxembourg is further fueled by foreigners' associations that seek to attract compatriots, in an effort to compete for influence. During the second decade, the thin line between migrants from Third countries and refugees becomes increasingly blurred. Migrants/refugees who want to leave their country because of environmental degradation or economic frustration, as well as sexual refugees are accepted by the EU and national governments after long but permissive procedures.[14] Each EU nation defines the number migrants/refugees it can absorb and integrate into its society annually, whilst maintaining its living standards and safety. These migrants/refugees travel directly to their final destinations, and illegal immigration has virtually come to an end because of the EU open border policy. War refugees who are eligible for the so-called Safe Haven operated since 2019 by the UNHCR in proximity of military conflicts, have no longer qualify for refugee status in Europe.

Europe. Immigration from European countries accelerates since the beginning of the European financial crisis. Frustrated with the persisting austerity measures imposed by the strong economies in Northern Europe migration from the Mediterranean Belt Countries accelerates. The Portuguese, traditionally the largest foreign community in Luxembourg, accounted in 2011 for more than 80.000 residents or 37.3% of the foreign residents in Luxembourg. Between 2010 and 2020, the unabated economic and financial crises drives up to 5000 Portuguese per year to resettle in Luxembourg. By 2030 the community has doubled to 160 000 residents. Several municipalities have more than 70% Portuguese residents and children follow a Portuguese primary school curriculum, cementing future inequalities. Disparities in the job market of the Greater Region motivate in particular French and Belgian to relocate to Luxembourg. Endless traffic jams on cross-border highways as well as other pull factors are strong motivations for many cross-border commuters from these countries to eventually take residence in Luxembourg.

Africa. Population pressure, socioeconomic mismanagement, resource scarcity and political instability fuel migration patterns to Europe and Luxembourg until well beyond 2030. In Luxembourg migration from sub-Saharan Africa started around 2005. In the second decade, the population of African origin (irrespective of nationality) in Luxembourg reaches about 10% and 15% of children born in Luxembourg have at least one parent of African origin. By 2030, this is true for more than 20% of children born in Luxembourg. With internet access in even small African villages it is generally accessible knowledge in Africa that in Luxembourg family allowances for 2-3 children per months easily exceed average annual net incomes in many African countries. Generous rules for family reunion facilitate immigration from Africa attracting post-school age youth with minimal education and high social liabilities to Luxembourg.

Arab world. Another migration wave started with the Arab "spring" and the Arab "winter" that followed, and send scores of Muslim refugees to Europe and Luxembourg. In the wake of the UN-Security Council candidacy, Luxembourg fostered close and friendly relationships with many Arab and Muslim nations. Increasing direct investments by the Gulf States into "blue-ship" Luxembourg companies, the establishment of Luxembourg as a prominent hub for Islamic finance (Sukuks) and an increasing number of direct flight from Arab/Muslim

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[13] No census information was found regarding the ethnic diversity of the population. Erhart and Fehlen (2011) add that there is no census information regarding the linguistic situation.

[14] Albrecht, Hans-Jörg (2002) Fortress Europe? – Controlling Illegal Immigration. In: European Journal of Crime, Criminal Law & Criminal Justice. February, 2002.

countries to Luxembourg paved the way for a strong immigration from the Arab/Muslim world. As a result of direct flights from Turkey starting in 2013, and from 5 other Muslim countries by 2020, Luxembourg became an important first country of asylum for refugees from across the Arab/Muslim world. As a result, the Muslim population grew from 12000 in 2013 to about 25.000 in 2020 and tripled again by 2030.

China. Around 2022, immigration from China reaches a provisional peak. The Chinese are very eager to comply with the PCI and in 2024 Luxembourg bestows its citizenship upon more Chinese residents, than China did upon foreigners of all nationalities combined.

By 2030, the country has become the most cosmopolitan and international hub of the world. It is formed purely of minorities that want to live and work in a global safe haven with social, economic and political stability. The "common" characteristic of the newcomers is diversity: diversity with respect to all aspects including origin, culture, religion, language, types of households, family size, attitudes towards democracy, integration, values and in particular education. The demographic evolution is further determined by vast differences in age structure and fertility. Average number of children per family range from 1.8 among Luxembourgian and most central European residents, to more than 5 in some communities of African and Middle Eastern origin. This is not without important consequences for cohesion and the school system. The trend will continue over the following decades, because immigrants are almost invariable youthful. While cultural diversity was highly valued, during the 2nd decade it became a challenge in terms of governance and the Luxembourgish identity.

Fig. 2.1 Age structure of national and non-national immigrants in the EU-27 on 2012.
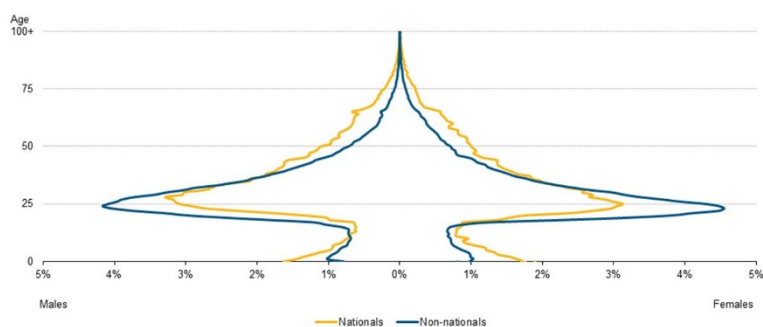
Source: Eurostat (online data code: migr_imm2ctz)

Nevertheless, several new developments in the early 20ies helped to mitigate population growth in Luxembourg and migration patterns world-wide.

(i) In 2022, the majority of the UN members ratify the Demographic Sustainability Act (DSA). The DSA is based on complex socioeconomic, ecological and geographic models to calculate the maximal population size that a country can comfortably support. For instance, DSA stipulates as a human right, the right of women to refuse having more 3 children and no more than 4 pregnancies. Most countries including Luxembourg link their development aid to compliance with the DSA. Initially DSA accelerates migration into EU and Luxembourg, but by 2030 it reverses population growth and migration to sustainable levels. In 2026, Luxembourg is finally able to negotiate with the EU an exemption from the open border policy for EU citizens from Mediterranean Basin Countries as well as for a more restrictive immigration policy for third-country migrants. The breakthrough was mainly due to the ratification of the Demographic Sustainability Act (DSA) based on the Population Development Grid (PDG). With the highest population density in Europe (except Malta) and a doubling of its population in barely 20 years, Luxembourg was able to demonstrate that it failed the DSA by all criteria of (demographic) sustainability.

(ii) In 2018, a joint study by OECD and the UN came to the conclusion that, 118 refugees can be supported in Save Havens in proximity of crises areas, for the cost of every refugee to be maintained in a Western country. This inaugurated a new and more equitable approach to the management of refugees. In 2019, the United Nations Security Council developed a Code of Conduct and Standards for Save Havens under UN Security Task

Forces. The concept of Save Havens was initially developed to provide standardized support under UN Administration for the hundreds of thousands of Syrian refugees in Jordan, Turkey and Lebanon. Carefully balancing pull factors, the Code was to be applied in temporary refugee settlements established in sovereignty exclaves placed under UN Administration. Ever since the successful implementation of Save Havens during the Syrian Civil War, these served as a model for the management of large numbers of civilian refugees. This led to a dramatic worldwide reduction in war refugees and displaced persons, while ensuring their safety and livelihood in an equitable way.

(iii) Europe's open-door policy and its efforts to mend its demographic and economic human resource problems at the expense of developing countries, was heavily criticized for destabilizing the economies of whole regions and countries. The help-yourself attitude of the EU for human resources was scourged as "neocolonial" by human rights movements, and pressure was high to revisit the immigration policy.

2.2 A problem of social cohesion[15]

For Luxembourg, one of its biggest challenge is the social cohesion of a population formed purely of minorities, with the indigenous population itself being a minority. By 2017 social tensions are clearly visible everywhere, resulting in stale elections, high drop-out rates from the school system, sectarian clashes, countless cases of language bullying and intimidations, intercultural court cases, and various levels of social tensions between different cultures and religions. By 2018, it becomes clear that this situation cannot continue.

The Plan for Social Cohesion and Integration. The Government's response is a compelling national Plan for Social Cohesion and Integration (PCI), mandatory for everyone within Luxembourgish society. This all-compassing legislation tackles the issue from three main aspects: (i) it redefines the very notion of citizenship; (ii) it sets out a strategy to enforce active integration of newcomers to form a national identity; and (iii) it identifies the education system as a key entry point to promote integration, identity and cohesion. The school system is targeted as a major center for intercultural -and intergenerational interaction. The prime objectives of the PCI are: (i) to create opportunities of interaction and understanding between cultures, (ii) to reframe or reinterpret the identity of individuals in society towards building a common identity of citizenship, and (iii) to create a sharing economy.

Through PCI the Government makes demands on both immigrants and locals, young and old. Demands include obligatory participation in intercultural workshops that explain and expand on the vision and future of Luxembourg as a cosmopolitan, economically stable, peaceful international hub of Europe. The workshops are designed to enhance ethnic awareness and intercultural dialogue between communities, to conduct annual polls and inquiries on the sense of identity and the meaning of being Luxembourgish; they offer positive dialogue and other lifelong learning courses and free online language courses. For companies there are free courses in teamwork building, time management of work and leisure for their multicultural staff, as well as offers to participate in socially responsible projects to meet their mandated requirements. Some events are obligatory, some voluntary, and these social service activities are organized by many different actors working in concert: the government, the private sector and most of all, the community hubs and the educational system.

Every aspect of societal integration is included. No individual or company is exempt from the PCI. For instance, accelerated construction programs, together with property taxes on idle residences lowered at least temporarily housing prices and enabled new immigrants to establish a residence in Luxembourg, a prerequisite for permanent citizenship. These and other measures enable the government to take responsibility for social well-being and to move towards a more horizontal democratic multicultural society. Integration and the quest for cohesion permeates all walks of Luxembourg life, but for some it is in contradiction with freedom and equality.

In order to acquire citizenship, applicants are obliged to demonstrate conversational level language skills in Luxembourgish and to take part in the political, social, sports and artistic events of their preference. These

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[15] Social cohesion is defined as "the willingness of members of a society to cooperate with each other in order to survive and prosper". Stanley, Dick (2003) What do we know about social cohesion? In: The Canadian Journal of Sociology.

interactions are followed up at regular intervals once they have qualified and become Luxembourgish citizens. The demand for citizenship was far from keeping pace with immigration. As potential barriers to becoming a Luxembourg citizen are repeatedly lowered (e.g. less than 5 year of residence), obtaining citizenship does little for social integration and cohesion. Luxembourgers remain a minority in the country, a challenge to the democratic legitimacy of political institutions. After the unambiguous "Nee" of the 2015 referendum, foreign residents obtain the active right to vote by 2020 and the passive right to vote by 2028.

The PCI does not attempt to homogenize society into one language and a defined set of customs, traditions and values in any way. It acknowledges certain basic human rights and values, in particular the right to be different. Social integration requires not only cultural awareness, but also emphasizes linguistic proficiency in two of the official languages: Luxembourgish, German or French.

Immigration continues throughout the twenties. Immigration is not only very high but also extremely diverse by essentially all criteria: cultural, ethnic, language, religion, socioeconomic parameters, education, attitudes, etc. No other country has such a heterogeneous and fragmented population of minorities. Efforts of the government to promote social cohesion such as the PCI are complicated by language barriers, gender issues and attitudes towards education, religion, and citizenship. Integration had largely lost its attraction, and by some communities it was seen as a threat and a challenge to human rights, freedom and equality of cultures. As a result, Government mitigation strategies were only partially successful and socio-economic and cultural disparities between regions and communities accentuated.

The national divide. A remarkable high-tech industry that caters to world-wide specialized markets for high-end products develops in the Eastern parts of the country, driven by Germany's economic success. Highly qualified workers cross every day from Germany into Luxembourg or take residence in the country. Besides Luxembourgish, German is the main language used in this part of Luxembourg. The teaching language throughout high school is German. English is the second foreign language, French the third foreign language. The South and the West of Luxembourg nurtures a more traditional industry, based on construction and lower-end products and services. In this part of the country the main spoken language is French. Here, the bilingual pre-school scheme had failed as few children learn Luxembourgish. The schools are bilingual but the children are not: While schools offers a bilingual curriculum (German and French), few children learn to communicate in German or Luxembourgish. In this part of the country, the teaching language in high schools is primarily French; English is the second foreign language, but most children remain essentially monolingual.

Luxembourg is driving towards a Belgian situation, where residents of the same country have no longer a common language or are unwilling to communicate in each other's languages. The hospitals are largely francophone, alienating Luxembourgish and German speaking patients and the large English speaking community. More and more cases become public where misunderstandings during surgery result in medical complications. The death of a surgical patients and the following lawsuit that starts with a prolonged controversy about the court language exacerbates the rift between language communities. A serious accident in a French nuclear power plant near the border with Luxembourg, only within weeks of a renewed 15-year lifetime extension, is a mixed blessing for cohesion in Luxembourg as it spurs large demonstrations across language barriers. Nevertheless tolerance with respect to a French language dominance in hospitals, restaurants, stores and francophone schools continues to erode.

While the Eastern region strives economically, the South-West becomes pray of the general crises that crippled the European MBC. Disparities between the two regions of the country in unemployment rates, income and educational levels, perceived inequities in social burdens and tax contributions further undermine the cohesion between the two regions. The rift between the germanophone and the francophone region was further accelerated when in 2026, 7 of the 9 German-speaking municipalities of Belgium ask to formally join Luxembourg. By 2030, in an effort to save the unity of the country, the Government proposed a constitutional change which turned Luxembourg into a Federation of two largely separated regions.

The flood of immigrants and asylum seekers increases religious diversity in Luxembourg, and the influence of some minority groups grows. During the 2nd decade most countries harboring asylum seekers experience serious civil unrest. Conflicts, fueled also by socio-economic disparities, spill over into Europe and Luxembourg. By 2030 Luxembourg has large Muslim communities, some eager to fill the religious vacuum left by secularization of public life, benefiting from

Luxembourg tolerance and values. By 2023, tensions in Luxembourg develop into conflicts over new mosques, religious symbols, gender rights and attitudes and most importantly different opinions about education. In 2025, a Sunnite and a Shiite mosque are built in Luxembourg, also attracting Jihadists. There is growing pressure on the Governement tomopen girls-only public schools, a Shiite madrassa in the South and a Sunnite madrassa in the North of the country. Headscarves and Quran lessons are mandatory in the madrassas and sports are prohibited.

Socio-economic disparities contribute to propagation of radical groups on both sides, attacks by extreme right wing groups on refugees camps increase in frequency. For its small size, open door policy, tolerance, and the rapidly growing Muslim communities, Luxembourg becomes a target of Islamic State in Europe (ISIE) activities. Most of the Muslim communities join hands with the Government to condemn these activities.

2.3. What are the drivers in the Luxembourg economy?

Luxembourg's vision was to leverage its current competences to maintain its position as the multicultural economic hub of Europe. In 2016, the center for counterespionage and data protection is established in Luxembourg. The choice of Luxembourg is owned to its position as a leading data center marketplace, its long standing experience in discretion with private information in financial services and its key position regarding EU institutions. With its high demand for specialist ICT services, the ICT industry consolidates, making Luxembourg an increasingly important research hub, driving moderate economic growth. This leads to a gradual transition from financial industry to ICT industry as the major driver of the economy. Furthermore, the strength of the ICT industry spills to the other sectors from the health and social sector.

Fig. 2.2 Workforce employed in each sector
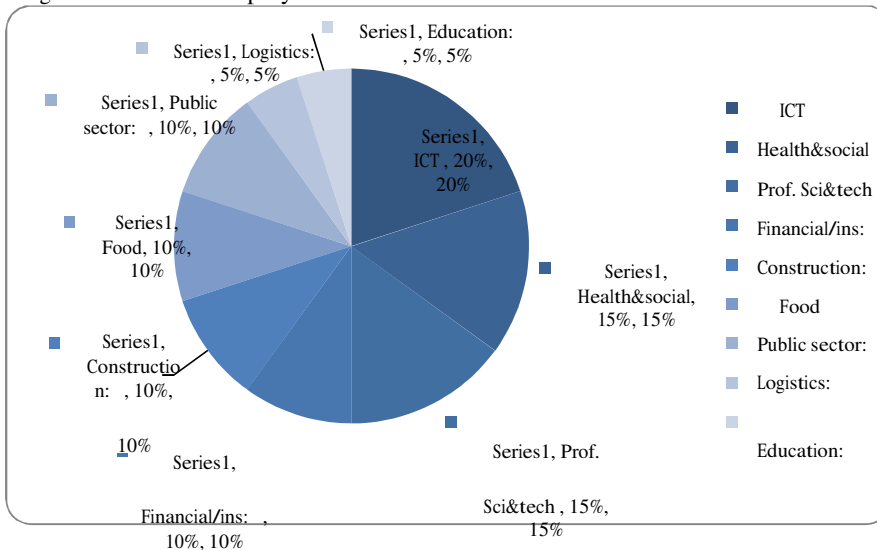
However, global economic growth is sluggish, unlike during the first decade. The ambitious social programs are challenging to fund with only a moderate economic growth of 1.8-2.5%. Luxembourg tries to maintain its high living standards by creating an economy with collective social and multicultural values, underpinned by the PCI. It is driven by synergies between public, private and the community hubs (administrative commune and schools). Sharing, reusing and recycling are the norm. Even though houses are smaller and many individuals have fewer possessions than their forebears, the shared public spaces, services and products create a comfortable quality of

living. Fundamental policy changes in terms of assessing progress not in terms of productivity but in terms of human flourishing have taken place.

Flexible working schemes are facilitated, but this is not without impact on the individual's social security. The work week depends on both the sector and personal choices. It ranges from 25 to 40 working hours per week. Furthermore, for individuals with family and a 40 hour work week, home office of 8 hours per week is encouraged if possible.

The community hubs are an essential component of the Luxembourgish economy. They are the meeting point for social and economic interaction, and they are funded by the PCI and local companies. The school system and the community hubs are inextricably linked, both influenced by the economy and the citizens' proposals in terms of curriculum and projects. Digital literacy has a high prominence not only for the ICT industry but for the political participation in the country. Furthermore, the private and the public sector have implemented the Luxembourgish Online Educational Platform (LOEP) with an open source educational platform to adapt and provide a personalized curriculum to all educational levels across many linguistic and cultural divides. The national language and economic divide cuts also across community hubs and LOEP. While the educational system in the North and East of Luxembourg benefit from the strong economy of the region and an eager middle class, in other parts of the country attitudes towards education, and economic problems undermine the companies' and parent's participation in funding programs.

2.4 Social welfare system
Through the 20's, Luxembourg requires a 3-3.5% economic growth to fund its pension liabilities. During the 2010s and the 20's these could only be reached by quantitative growth as qualitative growth lagged seriously behind.
The unselective immigration from Europe, was mainly driven by attractive social pull factors such as access to unemployment compensations, social security, health care, education, high-level care for the handicapped, family allowances etc. The pull factors were particularly tempting during the continuing economic crisis in the Mediterranean Belt Countries. Precarious and short work contracts for unskilled labour provide access to a generous social security system and unemployment compensation. In 2030, 75% of the unemployed have entered the country after 2025.
Education and wealth characterized only a fraction of the immigration. Unskilled newcomers sustain a particularly high unemployment rate. In an effort to generate growth and reduce unemployment, the Government attracts new high-tech industries that, however, do not cater to the employment needs of the growing influx of unskilled labor. In contrast, these industries are capital intensive and rely on only limited numbers of highly qualified employees. Unskilled jobs are taken over world-wide by blue collar robots designed to work with humans. Also certain types of white collar mid-level office jobs such as accounting, post office, customer services, pay-roll clerks, cashiers, book keepers and even secretaries disappear due to a combination of artificial intelligence, big data, improved automated analytics[16,] and voice-interactive computer programs. These trends result world-wide in a dramatic meltdown of employment opportunities, especially for the unskilled and Luxembourg was not an exception. Jobs needed are software engineers, computer and network systems and data base experts, as well as restaurant workers, and others providing personal services that cannot be automated. These trends also result in top and bottom salaries drifting further apart, and less middle class jobs with lower wages and skills. Concentrating on social skills for integration and cohesion, and with only a "minimal self-paced STEM curricula", the Luxembourg school system is also unable to supply the high-tech employment market. Thus new industries and their foreign human resource departments cater to the needs of their countrymen across the border. Luxembourg is looked in an inextricable vicious circle of being attractive to the wrong addressees.

Nevertheless, in a dangerous world, Luxembourg remains a beacon of relative peace and stability for high wealth individuals who flock to Luxembourg as a safe haven. Between 2010 and 2030, the social welfare system is supplemented by the influx of young educated and high-net worth immigrants who contribute but are not

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[16] Rotman, D. 2013. How technology is destroying jobs. MIT Technology review 116, 28-36.

eligible for the same level of services. The PCI restructures the finances of the social welfare system to reduce costs and change emphasis by linking citizens' rights to their responsibilities (e.g. health prevention).

2.5. Prevailing household family structure

Household family structures vary. Individual income, family values, cultural background and the type of employment are important determinants. Although there are single parent families and also three generation households, the average household size has dropped from 2.5 in the 2010s to 2.1 in 2030s. The strong emphasis on social integration expects the many newcomers to create new personal ties, and establish a new cultural identity in their new home and to promote their own integration. Although living expenses rise, the shared economy allows the maintenance of the living standards and the promotion of social relations and a healthy lifestyle. The Governments attempt to recalibrate the property bubble allowed the high net-worth newcomers to get a foothold on the property ladder.

The PCI has a profound impact on households. The voluntary participation of parents in the community hub and school system is complemented by mandatory involvement in interactions across diverse cultures and age groups. This process has also the benefit of giving the elderly and retiring members of society new meaning and status. Citizens participate in administrative and school meetings, and in other activities. This provides great opportunities for engaged parents to be more actively involved in their children's learning process. While some praised the Government's efforts to promote integration and social cohesion, others criticized them as heavy-handed interference in their comfort zone. Thus there were large disparities in uptake of voluntary and mandatory activities of the PCI across the country's communities.

2.6. State of the environment

An overarching societal consensus considers the state of the natural environment critical for the countries future. There is extensive national investment in environmentally friendly measures, and companies opt for high visibility projects where they contribute to environmental issues. Food, energy and water are carefully monitored to avoid waste at every level. The country has the infrastructure, risk management policies, and political mandate to avoid shortages. When all internal water resources were taped, Luxembourg had to import water from across the border to keep pace with the growing population's needs. The PCI promotes public awareness for the environment and resources in a world of conflicts over scarcities. High living expenses bring households and companies to zero waste policies. The community hub promotes an interdisciplinary systemic framework, linking political and environmental literacy with a sense of communal citizenship and identity. However, despite public transportation, traffic density increased and was exacerbated by extensive cross-border commuting. After only a short relief, population growth, smaller households and more space per household intensified inequalities on the real estate market. While not even in pace with growth, construction of infrastructure and housing sealed 0.8% of the national territory every year. Thus the unique demographic growth took a heavy toll on the environment.

2.7. Science, technology, knowledge

Political literacy, the building block of citizenship in a multicultural society is the main pillar of the educational system. Multicultural interactions and activities of the community hub are designed to promote social responsibility and skills for integration. It is the mainstay to build cohesion in the fragmented Luxembourg society. The student learn to listen, understand and use the knowledge and perspective of others. Through constructive dialogues with others, the student builds and reframes his perspective from others' feedback and creates collaborative solutions that benefit all. Building citizenship requires soft skills such as tolerance, mutual understanding, change of perspective, critical thinking and respect among others. In this respect, the importance of arts, history, and other social sciences is highly recognized. So too is the wisdom of the elderly, who find new meaning and play an active role in working with newcomers and first generation Luxembourgers to create the link between Luxembourg's historic legacy and the future.

Digital and scientific literacy is provided by a top public platform for online individual self-paced learning (The Luxembourgish Online Educational Platform, LOEP), with unlimited free access to individuals of all ages and educational backgrounds. LOEP is designed to keep the interest of the student through a novel, highly attractive, personalized interface and curriculum. Technologies comprise a mixture of ancient methods (agriculture and farming) to the latest cutting-etch technologies (ICT, nanomedicine, robotics etc.). Scientists gather around the question when to use complex high technology instead of more traditional approaches. Environment and sustainability cut across all sciences and systems thinking has replaced linear thinking.

Thus, the educational system has two main pillars: digital-scientific literacy and political literacy. The first one is provided mainly by the LOEP and consolidated through project-based learning and social activities; while the second one takes part in the project-based learning and the actual interaction between cultural groups that would normally not meet. As knowledge changes and is updated daily, knowledge of facts is irrelevant. Instead, skills are the focus of the educational system.

3. Luxembourg's community learning system

The influx of children with strong socio-economic and/or language handicaps paired with mixed attitudes towards education becomes increasingly a challenge for the school system as we know it. During the late ten's and the early twenties some of the lower qualifying branches of the school system had to accommodate up to 9% (up from 5.6% in 2013) per year of children with such short-comings. During the past 10-20 years, in an effort to curb failure rates, the Ministry of Education reduces the academic level and eases promotional criteria of the schools and this continues with virtually every additional reform. Until 2020, a single public school system albeit with different levels and shades continues to give priority to teaching and learning of children of an increasingly heterogeneous society. During the early 20s a rapid decay of social cohesion forces the Government to reconsider the role of the school and shifts to a dramatically new concept of schooling, the community hubs. These are centred on skills important for integration and social cohesion, such as cultural differences, family circumstances, health and others. The community hub forms the framework to improve cognitive, personal and social learning in an interactive process. It is meant to allow children from all backgrounds and their families to achieve high learning performances, by removing potential barriers. To achieve this goals the Government provides the municipalities with logistic and pedagogical advice.

The community hubs are the center of multicultural social interactions as expected parts of civic duties within some thirty re-modelled municipalities. The hubs are involved in both the traditional tasks of the commune's administration such as the management of waste, public spaces, sports, fire brigades, local associations and lifelong learning programs. Healthy living conditions, employment and social support networks are considered the key to enable families to provide the best conditions for the development and education of their children. The schools have been fundamentally integrated into the community hub: Students do not go to distinct schools but simply to the community hub. Schools are an integral part of a consolidated municipal life, the main goal of which is social integration and coherence. The concept of 'going to school' no longer exists—the community hub, the educational community hub and the "school of life" are all closely entangled with the administrative, social, sport and political life of the municipality. The educational community hub includes a wide range of services for children and families. Diverse community stakeholders are responsible for the same children and families. Families get out of isolation and intergenerational learning is promoted.

Similarly, the concept of 'teaching' becomes obsolete in 2025. It is the role of guides and coaches to facilitate learning. They guide students (both young and old) in their online theoretical knowledge education and more importantly, in their practical and interactive education. The theoretical knowledge education is supported mainly by the Luxembourgish Online Educational Platform (LOEP) which was initiated in 2018. This was soon supplemented by an ambitious collaborative venture with the Open Source Educational Platform Khan Academy (see footnote 18) which includes a personalized flexible curriculum tailored to meet the specific interests and capabilities of the student and the needs of the community. This knowledge is not simply academic; the practical and social aspects of knowledge education are grounded in team projects that take place inside and outside of the classrooms, as well as the participation in clubs and youth organizations. A wide spectrum of services of

different areas such as health and wellbeing, culture, sports, community engagement, are incorporated in the community hubs. Whereas the curriculum and the evaluation system are centralized, the projects and the social activities are driven by the specific requirements of individual community hubs.

The strength of LOEP and integrating both "learning" and "social integration" within community hubs, managed at the municipal level is that it accommodates the diverse backgrounds of the children and their parents both at a community and an individual level. There is a considerable leeway on how municipalities organized their community hub and the performance largely depends on the community effort to acquire the necessary competences. While some municipalities embrace the concept, others took a wait-and-see attitude. The size of the community hubs depends on the size of the municipality and its connection to the other municipalities. The total number of students is 180,000 from which 100,000 are in the primary level and 80,000 in the secondary level. Only 10% come from a three generation Luxembourgish family.[17]

3.1. Governance and finance of the community learning system

Governance. The governance of education is based on a nested system, overseen by the Ministry of Education. The educational aspect of the community hub is centralized in its governance in terms of the minimum STEM curriculum, the general guidelines for projects, the rules of engagement and the 360° and online qualitative/quantitative evaluation. The Ministry of Education is also responsible of the LOEP, the monitoring and accountability of the schools and the professionalization of guides. The government has the role of assigning the meta-rules of the community hubs; the Ministry of Education does that role for the learning aspect of the community hubs. The Government also defines the soft skills that are the national objective in terms of citizenship, integration and social coherence.

Within this framework, individual hubs have substantial autonomy. The educational section of the community hubs are decentralized and autonomous in two important ways. First, the community decides together general directions for the project-based learning and social activities that address their specific concerns. Both are defined in democratic ways and through proposals of the community. Project-based learning takes place in a multicultural environment both within and beyond the classrooms. Second, the director of the educational community hub is chosen alongside all the other members of the administrative commune. He is elected through a democratic election by the parents, guides and students taking into account the experience, professionalization and community involvement of the candidates. The director is supported by a steering group which includes stakeholders of the community: parents, representatives of the different services, school leaders and government representatives. The position of director is re-evaluated every four years, so re-election is always possible but not automatic. In this respect, the educational school system, the community hubs, provide children and immigrant newcomers with first-hand experience of the advantages and obligations of life in a democracy.

By 2030, the main strength of the community hub – the grass-root approach - also became its greatest liability. Although on a country level the population was very diverse, residents with similar backgrounds and languages tended to aggregate in the same regions and communes of the country. Different municipalities were predominantly inhabited by populations of Portuguese origin, others attracted mainly residents of Balkan origin and Muslims tended to gather in regions with mosques. The dichotomous French and German alphabetisation introduced during the second half of the tens further undermined the cohesion between different regions of the country, the South-West and the North-East. The democratization of the school organization initially did not attract much interest in some municipalities, until some groups realized the opportunity to shape the school system to cater to their cultural, religious, and language specificities and needs. No single hubs looks like the other, depending on local preferences as to which services are to be provided. So the range of services varies enormously: French schools, Chinese kinder gardens, Portuguese school curricula, Islamic schools with gender-separated classes, etc.

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[17] Projections contrasted with the baseline scenario in the Bulletin du Statec no. 5-2010.

The integration of the school into the community hub paired with the freedom to organize teaching and learning was view critically by the autochthone middle class and germanophone community. It was perceived as further downgrading of the "public school". The "public school" was no longer perceived as meeting their needs. As a result, those that could afford it, sent their children to private schools within the country or abroad. While already in the tens the private school could not meet the demand, in the twenties a sizeable number of foreign private schools had set-up campuses in Luxembourg. This disconnect between private and public schools undermined social cohesion and the role of school as a melting pot for integration. Others that were frustrated with the educational level in the community hub send their children to the more conventional schools abroad. The 6-fold increase since 2013 in numbers of cross border commuting school children became a matter of dispute between Governments within the Greater Region. Thus many of those that were desperately needed to support integration turned their backs on the public educational system. This development further eroded social cohesion.

Luxembourgish Online Educational Platform (LOEP). This platform is a dynamic partnership with the open source educational platform of Kahn Academy[18] that the Luxembourg Government initiated in 2018. The LOEP is constantly adapted to the country's needs and personalized to each child's development. The platform consists of diverse pedagogical online lectures regarding all subjects, tests and resources for the students; as well as pattern learning tracking systems, social networks, and other tools for guides and parents. Access to the online curricula is easy and free for everyone. The LOEP plays key role on the government's capacity to allow the high degree of freedom in the project-based learning while maintaining a minimal standard of STEM education. This platform guarantees interactions between all sectors of society. The LOEP is meant as a sort of benevolent big brother of the communities' life. In general, it reduces school costs, increases the curriculum's quality and allows a high degree of self-paced and individual learning, as well as community interaction. As importantly, it creates an overarching commonality linking cultures and backgrounds of the 1 million Luxembourg residents of today.

While LOEP was initially received enthusiastically its attractiveness faded, as digitalization and "gamisation" embraces all walks of life. By the late twenties its school-associated stigma is similar to that of "books" in the past. There are vast differences in uptake and use of LOEP between pupils, communities and regions. The strong pupils immensely benefit from the 24/7 and 360 availability of information and knowledge. The weak pupils poorly manage self-paced learning and discrepancies between strong and weak students exacerbate. Expectations that accessibility of knowledge and teaching aids would overcome social inequalities are disappointed. Studies show that attitudes of parents towards education continued to be the most important factor in promoting educational inequalities.

Finance. As the very nature of education has changed, so too has the economy. Over the past 20 years, schools have been absorbed into community hubs and staffing costs have been dramatically slashed by reducing the administrative burden and reducing the number of teachers. Guides (today's version of teachers) spend 70% less time in preparing lectures, checking homework and evaluating tests than teachers once did, because these activities are mainly performed by the LOEP. Guides are paid by the government and represent 50% of the educational costs. The guides provide their personal expertise according to the needs of the school: e.g. information and communication technologies. The student projects bring resources into the community as well as extra money to allocate towards education. As of 8 years of age, students can take part in 10 hour week jobs or trainings of their preference, and this process of learning continues unabated across all sectors, ensuring that there is a living interactive 'school of life' for all. Maintenance, equipment and cleaning costs are absorbed by the communities. Otherwise the educational community hubs are public. Energy and water costs are provided by the national grid for free. In general, costs are widely spread across stakeholders but the uptake is very mixed across the country. While some municipalities with the support of parents and the private sector embrace every

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[18] Khan Academy: http://en.wikipedia.org/wiki/Khan_Academy. Khan Academy is a non-profit organization with the mission of making education available for anyone anywhere in the world. Its platform provides resources on many subjects for student self-paced learning, and the monitoring of progress of the student, the teacher and parents.

opportunity to improve the "teaching and learning environment", the weaker municipalities are less willing and invest at their own pace in their own priorities.

Evaluation of the school system. The government tracks quantitatively and qualitatively the performance of the educational community hub through the LOEP and there are also online surveys on well-being and satisfaction in each community. Its recommendations are a combination of top-down measures and the communities' feedback. Not meeting the standards brings a whole plan for strong recommendations and follow-up workshops on its improvement guided by the community itself.

Self-evaluation of schools. Also the community applies 360° evaluations of all actors in the hub through online surveys and posterior meetings every six months. The government gives guidelines regarding the evaluation criteria. The evaluation criteria are agreed upon between a group of democratically elected expertise, guides, managers, parents and students.

Student's Evaluation. The evaluation of students includes two aspects: the LOEP learning tracking pattern and the 360° evaluation. The LOEP learning tracking pattern provides (i) quantitative data about the performance in watching and responding to exercises and (ii) qualitative in terms of the time spent on each skill or subject. The 360° evaluation involves soft skills and it is done by parents, guides, team players and the student himself. Students also evaluate themselves and others in the 360° evaluation in order to learn constructive feedback.

While some communities are very interested in a strong educational part in the community hub others are not. Some push for strong evaluation criteria while others follow other priorities. The Government tried to maintain the principle that all communities and children should be evaluated according to the same grid with respect to the STEM subjects, while the failure rates were low in some communities, the same criteria failed up to 70% of the students in other communities. When the Government introduced a more flexible evaluation system, the learning part of the community hub degraded. Despite the Government's effort to mitigate these trends municipalities became known for their weak, others for their strong curricula. While a middle class and germanophone population continued to value education, other ethnic communities pursued other priorities further promoting voluntary segregation and internal migration into municipalities with less demanding educational systems. This in turn further undermined the primary goal of the community hub as a melting pot and a stage for integration.

3.2. The curriculum

General overview. Education focuses on a single vision: One multicultural, multilingual, stable Luxembourg. The Plan for Social Cohesion and Integration (PCI) underpins the entire curriculum, linking immigrants and Luxembourgers, young and old, and those with differing capabilities, linguistic backgrounds, and ages. Every child, economically active individual, parent and company is expected to participate and contribute to the educational and communal system in some way as their civic duty. The educational system of the community hubs comprises a wide range and flexible curriculum from 2 to 99 years old. Learning can take place everywhere: at home, in the community hub or outside. Classrooms are liberated from lectures and testing. Instead team projects solve problems through dialogue, active involvement, and empathy between children with different backgrounds. The educational system aims to create curiosity and engagement through the flexible and personalized LOEP curriculum and the teamwork projects. Students are invited to look for subjects and projects that meet their interests. Furthermore, the role of students is to engage from an early age in civic participation and integrate to the productive economy. The educational system is student-centered and the role of the student is to find out his character and his strengths and weaknesses.

Fig. 3.1 Two cornerstones of the educational system

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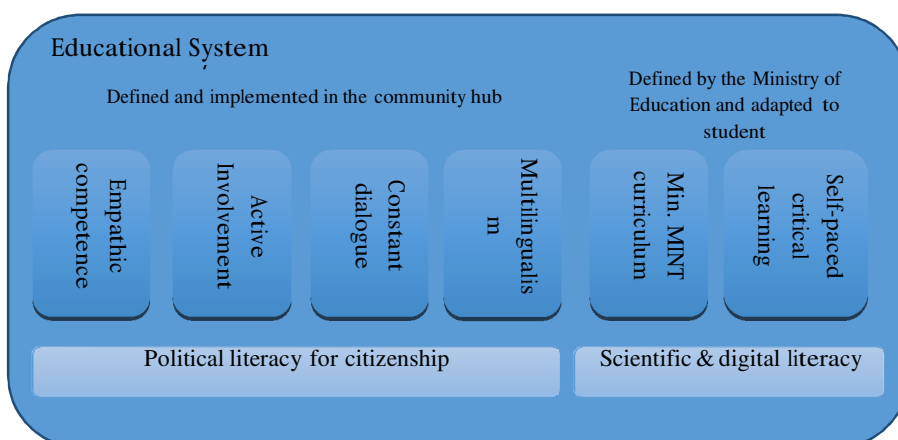
There are two cornerstones to the educational system: scientific-digital literacy, and political literacy.

The scientific-digital literacy comprising mainly STEM is directed by the LOEP. The Educational Platform provides a flexible and personalized minimum STEM curriculum. The STEM curriculum does not only impart scientific and technical knowledge but it emphasizes critical observation skills, systematic aggregation of observations to come to own knowledge-based conclusions and solutions alone or in teams; to develop own concepts and models to come to new knowledge and to learn from mistakes. Students learn to communicate thoughts and opinions in a precise, qualitative and quantitative way, exercising both scientific content and language skills. The STEM curriculum plays an essential role in educating children to become critical, responsible, and informed mature citizens. The platform monitors the student performance and achievements, the time spent on each topic. Qualitative measurements monitor the student's potentialities and weaknesses. In order to use the LOEP, the first years of primary education involve early reading and digital literacy in order to later free the student for a more self-paced individual critical learning.

As learning was largely self-paced STEM education further degrades. Motivation of the parents is the strongest driver of success in this permissive school environment and flexibility mostly favors downwards trends, in particular among socially handicapped students. In 2030, it becomes increasingly obvious that the education had to be aligned with the high level of public funding in research and the increasing need for STEM graduates. A strong STEM curriculum based on LEOP but taught in a more traditional school-like format that matched the country's aspiration in sciences and technology is reintroduced as of the fourth class, to close the discrepancy between education and the country's needs.

Political literacy aims to prepare children for citizenship by focusing on four building blocks for social cohesion and collaboration (an intercultural citizenship education):

• Multilinguism. After the introduction of bilingual alphabetisation, multilinguism became more and more a matter of interpretation and national debate. Multilingualism for children that follow the Luxembourg curriculum refers to speaking at least 3 languages: proficiency in two of the three official languages (LU, DE or FR); English is obligatory and adapted to the student. To exclude language deficiencies as an obstacle, LOEP offers its STEM curricula in a variety of other languages, that can be chosen according to the capacity and convenience of the student. Multilingualism is recognized as essential as it provides access to the otherness, other culture's values, attitudes and perspectives.[19] Multilinguism exposes the students not only to the local community level, but also to national, regional and EU concerns so stretching their frame of reference and enabling them to become democratic citizens of Luxembourg, in a united Europe.

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[19] Hu, Adelheid (2011) Proceedings of the 2009 China-EU Multilingualism Conference. In: Intercultural Competence in a Multilingual World : Policies-Research-Language Education. Beijing. Hanban.

- Constant dialogue refers to the constant exposition of the students to transparent and effective communication, both verbally and non-verbally. Students are actively engaged in dialogue and the guide provides them techniques for effective and transparent communication as well as awareness of the verbal and non-verbal communication. The guide also serves as an example of active attention and active listening. There are innovative roles for elderly custodians as historical witnesses and language tandems. Furthermore, collaborative community projects expose the students to other students with different backgrounds working together to resolve the challenges that are set to them. Dialogue promotes critical thinking, deep listening and intercultural awareness.

- Active participation or involvement[20] takes place at the individual and community levels for all. Each student is individually engaged in the planning of their own education in terms of content and projects. They are also involved in the administration and decisions of the educational community hub through democratic processes. Democratic participation in the planning of education in terms of content and projects at the municipal level, however, became increasingly a liability as differences in motivation and interest in education between children, communities and municipalities were large and mitigation became increasingly difficult.

- Empathic competence is the ability to recognize emotions in others and understand their perspective as the basis of mutual respect, understanding and tolerance. It is fostered through multilingualism, constant dialogue and active participation. Empathic competence is directly addressed through the STEM curriculum, artistic expression, literature, history and critical thinking of current events. It involves the social sciences, arts and music, besides the social interactions of the classroom. As the STEM curriculum was thoroughly monitored through LOEP, social sciences and humanities and languages strongly compete for the student's attention.

Examples that encompass the type of projects for political literacy and the consolidation of scientific literacy are the following:

- Model United Nations[21]: Students research and discuss international issues as if they were diplomats in the United Nations.
- Teamwork: Students improve playgrounds or grow a community garden as a year-long project that brings together students that would normally not meet, in order to achieve a common goal for the benefit of all.
- A day in the shoes of: Students experience what is like to be a farmer, a politician, a lawyer, a businessman, a teacher through a day of visiting a professional or through play role.

Fig 3.2 Daily time spent in educational activities: teamwork (community hub), the LOEP and social activities
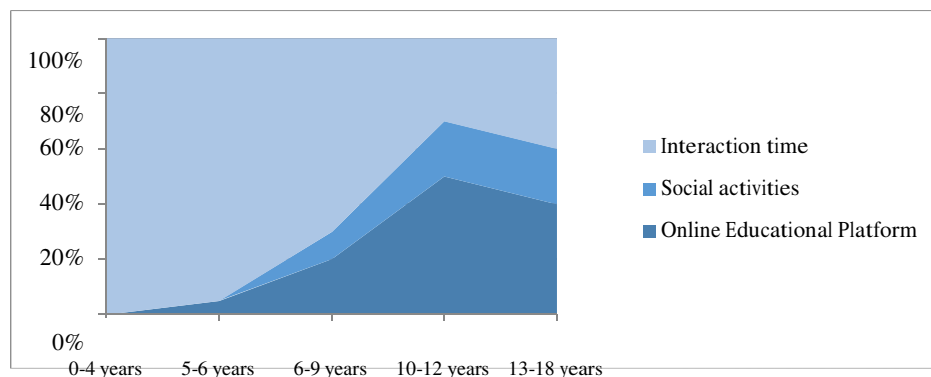
Curriculum in detail

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[20] Weare, Katherine (2003) Developing the Emotionally Literate School, SAGE.
[21] Model United Nations: http://en.wikipedia.org/wiki/Model_United_Nations

The educational system demands a minimum STEM track that represents 40% of the total curriculum in the LOEP while the other 60% of the track involves specialization in one of the areas above according to preferences and potential.

STEM. The minimum STEM starts at the age of 5 and continues throughout high school to comply with the countries needs in these areas. From 4th grade on, the minimum STEM curriculum is personalized learning via LOEP according to the potential and interests of each child. Each subject of the STEM curriculum is first presented as a concise map of interconnected main skills and content. As the student begins a certain subject, the map zooms in detail showing deeper content and skills to develop. As the student progresses, the map highlights the interesting and the minimum tasks and content to pursue. The STEM curriculum is offered in a various languages to adapt to the students' needs and to disconnect it from the language proficiency in German, French or English.

In this way, the minimum personalized STEM curriculum will demand the student to attain a minimum level of the subject (in the case above math) according to his interests and potential. The student is further motivated to advance in his knowledge of a subject's world through gamification[22]. The student can share his awards with friends or keep them confidential. In the twenties, gamification was praised as the solution to deficits in self-motivation and confidence, however, its attraction eroded as it became increasingly associated with education and learning.

Languages[23]

Speaking at least three languages is considered an integral part of being Luxembourgish. After a revival in the early 20's, Luxemburgish continues to be the most frequently used language and warrants basic integration to social life and citizenship. Therefore, emphasis is still given to it. The language curriculum is essentially symmetric for GE and FR, with one strong (first foreign language) and one weaker (second foreign) language. Both languages as well as English are mandatory for all students.

Crèche. The introduction of languages follows a partly defined and flexible pattern. The obligatory crèche starts at 2 years old where children attend at least 15 hours a week. The Government actively encourages Luxembourgish as the language for the crèche. Public funding and free access to the crèche is linked to the use of Luxemburgish. In special cases the Government allows that the crèche uses other languages. However, this became quickly the rule rather than the exception for foreign residents. Many crèches were de facto French speaking and some crèches were English speaking to cater to increasing monolingual communities, undermining the effort of the Government to prepare all children born in Luxembourg to the Luxembourg school curriculum. The Government did not have the political will to systematically withdraw financial support to the crèches that do not prepare for the Luxembourg public school system and thus do not contribute to social cohesion. As a result even children that are born in Luxembourg often do not learn Luxemburgish or German, or even French, and are not sufficiently prepared during preschool for the Luxembourg curriculum, seriously compromising their future perspectives in a multilingual society

Primary School. The first three grades of primary school involve language, reading and digital skills and here the guides play a more active role. Almost no use of the LOEP is involved. From 5 to 12 years old, the student takes one of the two tier track options of the community hubs: German or French. At 8 years of age, they start with GE or FR as a second foreign language. At 10 years the student must start with English language or one of the other official languages. The level of English and the fourth foreign language depend on the interests and potential of the student.

The different language communities greatly differed in their interpretation of multilinguism. In the germanophone community children were keen to embrace the three languages (Luxembourgish, German, French) and learn English as the international language. In the French speaking community, the bilingual preschool scheme fails as few children learn Luxembourgish. Children who follow the French alphabetization
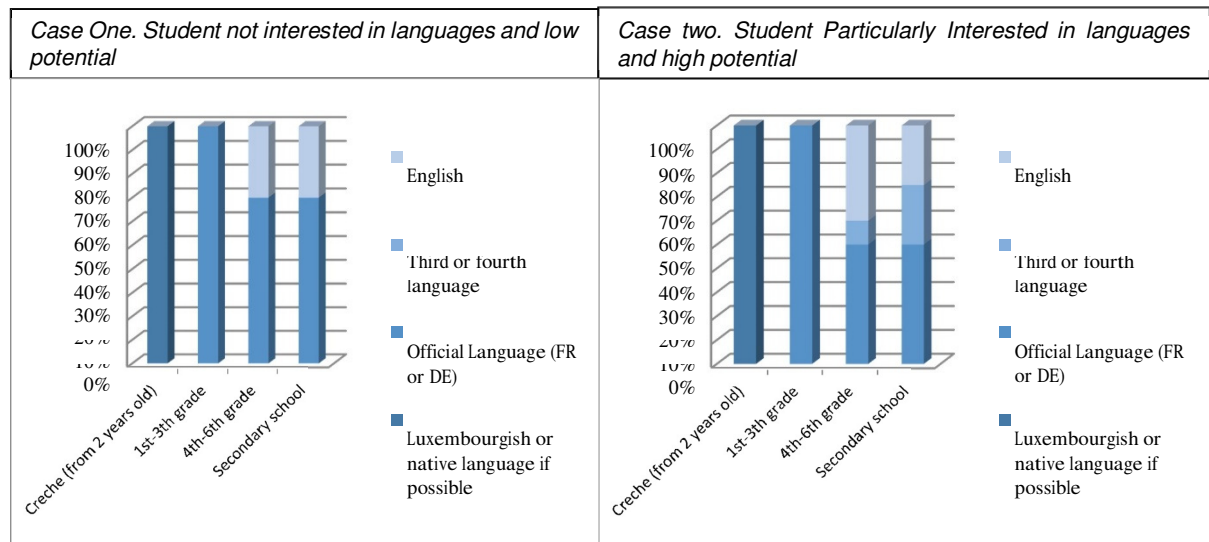
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[22] Gamification: http://en.wikipedia.org/wiki/Gamification.

[23] Partially based on recommendations by: Tröhler, Daniel (2014) the NESET Country Report: Luxembourg. University of Luxembourg, Institute of Education and Society; and Weber, Jean Jacques (2007) Rethinking Language-in-Education Policy in Luxembourg, Forum für Politik, Gesellschaft und Kultur in Luxemburg, 264.

became further deprived of the opportunity to become proficient in the other three languages. While schools offer a bilingual curriculum (German and French), few of the francophone children learn to communicate in German or Luxembourgish.

The community hubs have to accommodate scores of children that arrived after the age of 6 in Luxembourg and do not speak any of the 3 languages used in Luxembourg. An evaluation is made to define which of the two languages is more convenient and sensitive to the child's situation. Integration into the educational community hub will begin with intensive online language classes and a compulsory language tandem normally with the elderly. For extreme cases of difficulties, the students are allowed to use real-time translators during social activities while acquiring a minimum B2 level of the two tier language track (German or French).

Fig 3.3 Two cases of personalized time devoted to language by educational level

| Case One. Student not interested in languages and low potential | Case two. Student Particularly Interested in languages and high potential |

High School. In high school, the students can select between French and German as a teaching language for humanities and STEM. Students who select the French curriculum take reinforced German language courses, while students with a German curriculum take a reinforced French language course, to improve their language proficiency. English is the third foreign language. To mitigate some of the language problems (the equivalent of) high schools are encouraged to have exchange programs with German or French-speaking partner schools in the Greater Regions. To overcome language barriers, LOEP is offered in a number of other preferred foreign languages. Thus learning of STEM and humanities is disconnected from the proficiency in German, French or even English. This flexibility is considered one of the greatest merit of LOEP, since it did not require to segregate students in "classes" with different language preferences.

3.3. Learning, teaching and the teaching profession

Guiding or coaching. The guide positions himself as a moderator, an adviser, and a mentor. They guide their online theoretical knowledge education and more importantly, they monitor and advise the student's practical and social knowledge education. He tries to keep a neutral position to simply engage and arouse the dynamics of the teamwork and the curiosity of the students. Guiding also implies helping students reframe their perspective or expand their views with the feedback of other students. Coaching requires soft skills, pedagogical and psychological experience, emotional intelligence and self-motivation. Guides must have good speaking and language abilities, critical thinking and systems thinking, and a genuine interest for the community's concerns. The guides take part in obligatory lifelong learning workshops about positive psychology, social psychology, ethnic awareness and social cohesion. They are not supposed to know everything and have all the answers, but

they know where to find answers. They engage professionals in school projects, in particular of secondary level education. For children up to 12 years old a Master in Pedagogy is required.

Role of parents and grand-parents. Parents are important stakeholders of the community hub. They have a minimum obligatory participation in school meetings and are involved in shared decision making and planning. Their manual and theoretical competences support the guides in various ways, e.g. by involving themselves in Saturday morning classes. They are also encouraged to participate in life-long learning courses offered by the hub, e.g. to reskill them for employment. Also, grand-parents and the elderly are close to the community hubs and provide language tandems and social support. Parents and grand-parents follow the learning pattern of the student through the LOEP and meetings, sometimes working alongside their children. However, voluntary involvement of parents and grand-parents widely differs according to inclinations and potential in particular in STEM. In particular, pupils with a migration background can normally not rely on grand-parents or even on their parents.

Design of learning environments. The learning technologies evolve around the LOEP if not from it. The community hub has a computer room for those who prefer to study there instead of at home. The indoor classrooms are rather meeting rooms in which tables and chairs are rearranged flexibly according to daily needs. Learning activities can also take place outside of the classroom.

Perspectives

Luxembourg's population growth and diversity is world-wide unique. Language disparities, socio-economic inequalities and different visions challenge social cohesion and integration. The scenario exaggerates the current situation of immigration and high population growth rate to discuss expected challenges to come. The educational system is totally transformed to maintain social cohesion and offset unavoidable social tensions, largely at the expense of traditional learning. Societal developments confront the citizen with a demanding political and social agenda that does not allow them to shirk from their civic obligations. Reactions of citizens and communities are difficult to predict but the best one can say is that they are mixed. The scenario fails by all sustainability criteria, since physically speaking, population growth cannot and will not continue indefinitely. Thus, this scenario describes a relatively short transition period in Luxembourg's history. While this period may end already during the thirties, it will transform our society in an unprecedented way. How Luxembourg will be in 2030 and beyond, is still for us to decide!

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