

## Chapter 3

# Four Models of Higher Education in 2030



**Abstract** This chapter provides four models of higher education for the year 2030, namely the Tamagotchi, Jenga, Lego Set, and Transformer models. The Tamagotchi model represents the classic approach to higher education, starting right after secondary school and leading up to a bachelor's or master's degree and then transitioning into employment, finishing the path of higher education. The Jenga model, while similar to Tamagotchi, appeals to nontraditional students because of its shorter learning span and focuses on later phases of self-learning and -organization. The Lego Set model is fittingly named after the individually combined modules of different sizes, making for a self-reliant and non-standardized learning path rather than one compact unit. The Transformer model represents learners whose initial phase of education may have long passed, but who return to higher education to acquire new basic knowledge or upskill their formal education. It relies on the idea that everyone must have opportunities to leave their current professional paths and change course.

Figure 3.1 shows the four learning paths in individual career. The blocks represent the main learning phases of higher education. Of course, learners may be working while they learn or pursuing other societal commitments.<sup>1</sup> Phases without blocks are outside the higher education system and characterized by work or other social commitments. Each learning path is named after a toy that roughly represents the main characteristics of this learning path. However, these names should not be taken too seriously; they are simply intended to help readers remember the core properties of the four models.

---

<sup>1</sup>Currently, approximately half of all students work at least a few hours a week during their studies (Masevičiūtė, Šaukeckienė, & Ozolinčiūtė, 2018).

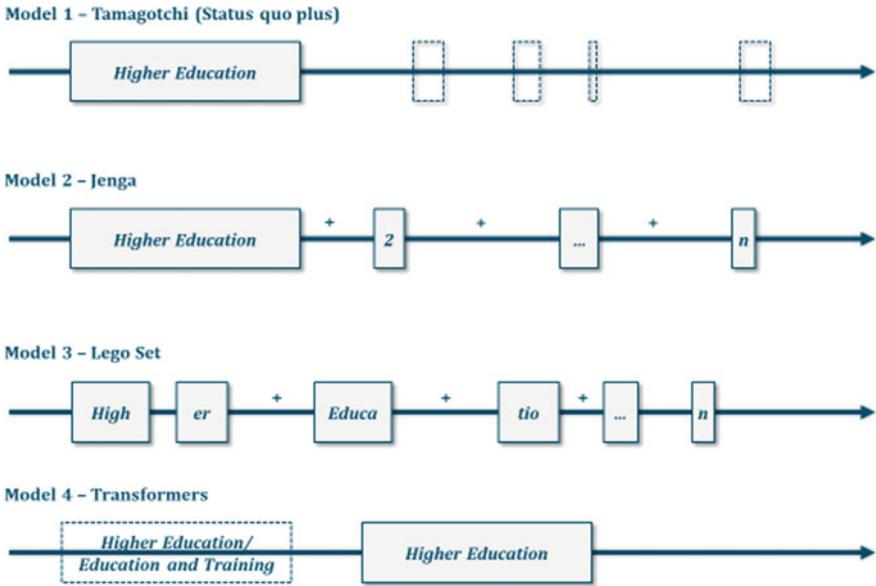


Fig. 3.1 Four learning paths in the 2030 higher education landscape. Source Own illustration

### 3.1 Brief Descriptions of the Learning Pathways<sup>2</sup>

#### 3.1.1 Tamagotchi: Higher Education for a Good Start in Life

##### Tamagotchi

*A closed ecosystem that is built around individual students. The focus is on the beginning of the learning path.*

In this model, **students** are beginning their careers. Secondary school education is completed with the acquisition of higher education entrance qualifications. The transfer to the university takes place immediately afterward. Students study full time, until their three- or five-year courses end, depending on whether they are aiming for a bachelor’s or master’s degree. After graduation, the graduates begin their careers. The purpose of higher education is to enable graduates to obtain work-related skills and to create a knowledge base that enables them to make the transition to employment. When students graduate, learning within the higher education system is essentially finished. Most further learning is nonformal, informal, or demand-oriented, guided by

<sup>2</sup>Footnotes in the following section reproduce some comments from the international survey (see Sect. 6.1.3) on the respective models.

each individual's professional situation. Further education is undertaken but without an explicit connection to previous study phases.

This model assumes that graduates will continue to be offered a future-proof education; they will not be trained simply to meet the requirements of the current labor market but will acquire skills that enable them to help shape their environment.<sup>3</sup>

The **didactic concept** of the Tamagotchi model supports learning and personal development through a learning path that has clearly defined steps and results. This path continues the school-system approach previously followed. Ideally, secondary and tertiary education are well-coordinated, allowing the transfer to higher education to occur without major discontinuities. The concept supports academic orientation on the one hand and a certain degree of self-organization and independent learning on the other.

**The university** remains the central teaching and learning space. Students are part of a community that promotes the social inclusion of individual students. In addition to exchanging information on campus, students also learn with the support of global communication networks, simulations, and augmented reality techniques, which expand the physical learning environment. Future learning experiences in the professional world will be integrated through innovative learning spaces, such as makerspace and fablabs, but also through traditional internships.

In this model, each university is responsible for **control and coordination**, as well as the design of the degree program. The introductory phase of studies and thus the change from school to university are important points in the design.

The Tamagotchi model follows the traditional concept of higher education. It assumes that the knowledge and skills acquired at university give learners a future-proof competence profile and enable them to adapt flexibly to future requirements.

One **central factor that influences the success and attractiveness of this model** is the diversification of the student group. So far, learning has taken place in cohorts (relatively age-homogeneous groups) which generally need a certain educational background to be successful.

If universities recruit more alternative target groups, such as older students, this may lead to a fundamental change that will not reflect the Tamagotchi model approach. However, universities will have to react to the growing permeability of the higher education system by meeting the needs of diversified, often (partly) employed students more fully and precisely. As universities respond by offering more flexible courses and student-centered teaching, this model will come under pressure.

To help degree programs become more flexible, governmental steering regimes will have to adapt by reconsidering key figures relevant to the distribution of funds, such as graduates within the standard period of study. They will also have to develop clearly defined control approaches.

---

<sup>3</sup>Moreover, this model remains relevant to the process of preparing young scientists for academic careers.

The example of Minerva (see Case: Minerva) shows how the Tamagotchi model can be developed through innovation; here the model offers networked, campus-independent higher education in bachelor's programs, consistently exploiting technological possibilities and removing spatial restrictions. At the same time, this case succeeds in maintaining the care and support promised by the Tamagotchi model.

### **Case: Minerva—The World as a Campus**

#### *Relevant for the model: Tamagotchi*

At first glance, Minerva looks like an ordinary university, and that's what it's meant to be. But if you look under the surface, you discover a whole new approach to university-organized education. Instead of a traditional campus, Minerva has a network of seven satellite locations around the world. All courses are offered online, to small groups of 20 students. Students live in shared dormitories, even though classes are held online. Minerva reveals the possibilities that exist when digitization is understood and realized in a transformative way. In this context, traditional ways of organizing education can be presented in completely new forms.

The private university was founded by Ben Nelson in 2012, with the aim of offering “Ivy League” quality education, in combination with a different concept of the learning community. Despite the central role of video-based teaching, Nelson does not believe that Minerva is innovative because of its technology. For him, the innovation began with a new pedagogy, built around 100 important ideas, which can be taught, applied, and evaluated (the list includes both patterns of critical thinking and scientific concepts). The technology is not decisive, although this approach could not be put into practice without it.

At Minerva, innovation does not end with a new video system but involves a continual questioning of what role the campus can and should play in this model. Initially, Nelson and his colleagues did not want to replace the social experience of living and learning together, but to improve it. To do this, they did not need their own canteen, lecture halls, library, or fitness facilities, as these are available in every major city and can be shared. Students develop a bond with their cohort, but not with a particular location. The university gives them opportunities to get to know about different cultures and environments.

What does teaching at Minerva look like? All courses are conducted live via video by professors working with small groups of up to 20 students. In this seminar-like approach, instruction, discussion, group work, and assessment are freely mixed—professors have access to “real-time” information on the students' learning progress and can thus adjust the pace and content. Although Nelson mainly talks about the higher quality teaching that can be achieved, another advantage is the flexibility of physical learning spaces. It is no longer necessary to invest in large lecture halls—students can log in from a café or from home—and intelligent technologies can take the strain off tutors.

Minerva is an example of how digital technology can extend a model like Tamagotchi, which is based on familiar technology. The distributed-learning approach could also be applied to the Lego and Jenga models.

### 3.1.2 *Jenga: Higher Education as a Solid Foundation for Further Development*

#### **Jenga**

*Universities offer a solid foundation of knowledge to build on; this foundation can be constantly expanded by teachers.*

As in the Tamagotchi model, students are expected to begin their studies immediately after obtaining university entrance qualifications. As a rule, students study full time for up to three years,<sup>4</sup> acquiring basic knowledge and skills. The initial university period is shorter than that in the Tamagotchi model, appealing to **nontraditional students**, for whom four or five years of study would be too long. However, this assumes that learners will expand their knowledge through additional modules over the course of their lives and after interruptions. Depending on each individual's professional situation, these modules can provide upskilling opportunities or sideways skills acquisition.

The central idea is that university studies, in the traditional model, are not flexible or integrative enough to be future-proof in a highly dynamic environment. Courses of studies must, therefore, be conceived more broadly, with a longer perspective. In the initial study phase, individuals learn the basics; these skills are then supplemented later in life. In this model, a didactic decision must initially be made to define the educational foundation needed to begin a specific career and the content that should be provided later, in shorter phases of continued education. Whether the basic foundation includes general or transversal competences or specific basic knowledge depends on the discipline and university.

It is important, however, that the **didactic concept** initially focuses on a basic phase (basic study), which supports later self-learning and self-organization. In this phase, students' learning and personal development proceed along a clear learning path, with fixed steps and clear results. In the first block phase of this model, learning takes place mainly on campus, with the support of global communication networks, simulations, and augmented reality techniques that extend the learning environment through online experiences. Through internships, makerspaces, and fablabs, early

---

<sup>4</sup>Like junior colleges in South Korea and so-called "accelerated degrees" in the UK.

connections to the future world of work are established. After successfully completing their studies, students leave university and enter professional life. **Universities** help to prepare for this transition and focus on this task within the Jenga model. The second learning phase consists of **several learning units**, which the learners themselves choose, often taking into account the changing competence requirements of the labor market. The short study blocks can be offered by various training providers; they can take place either on-campus or online and can also be combined.

**Formal recognition** of the first learning block is guaranteed. The recognition of other learning units depends on how such studies are organized within the higher education landscape. Learners will have opportunities to reach outcome-based agreements with individual higher education institutions, covering both the initial learning block and additional units. In this way, Learning Phase 1 and Learning Phase 2 can be integrated into a single study program. However, the two phases can also be accessed independently.

The Jenga model consistently responds to the needs of students and the labor market. This study design can prepare for and respond to new **needs from the world of work** without abandoning the basic structure of a university course of study.

One example, “MIT MicroMasters,” represents an innovative variant of the Jenga model. After students acquire a bachelor’s degree in Phase 1, their MicroMasters learning can be organized very flexibly during the second phase. MIT thus offers an innovative variant within the existing system.

One major innovation could involve developing an entire study program that would be provided by different providers during different study phases. Students would be accompanied throughout the study program, even if only the first part took place at their own universities. Under this system, universities would require digital student-administration systems and “stackable” **individual digital certificates**, which could later be used to recognize a complete course of study. The question remains whether preparatory colleges and other providers would collaborate with traditional universities to create partnerships of this type, or whether they would rather develop their own overall study/training programs.

### **Case: 42—Focus on Project-based Learning and Peer Evaluation**

*Relevant for the models: **Tamagotchi, Jenga***

Olivier Creuzet (Head of Pedagogy at 42): “We actually lie to our students. We say they will develop technical skills, but we want to develop adaption, self-learning, creativity, and other soft skills.”

One characteristic of the Jenga model is direct access to the labor market. This was also the goal of “42,” an innovative school for software developers in Paris (with an offshoot in the U.S.), founded in 2013 by Xavier Niel, a French multimillionaire. Access to 42 is free and organized like a computer game. Interested learners must first pass the “Piscine” (swimming pool), a kind of four-week entrance exam, which mainly tests their ability to co-work with others and apply new knowledge. Success in the Piscine is independent of

existing programming skills. Each student then works on a consecutive series of projects and simultaneously provides feedback on other students' projects. As in a computer game, each project can be improved as often as necessary before students advance to the next level. This all sounds very modern, but Olivier Creuzet attributes it to a classic constructivist approach developed by Piaget and Montessori. What's new about 42 is that this approach can now be implemented cost-effectively in larger groups with the help of technology.

Most learners do not yet have a university degree; through 42, they find a direct path from secondary education to their first jobs. There are exceptions, however. Some students enter 42 to learn practical programming skills, after completing a traditional degree. Others are already working as professionals, but want to reorient themselves; a course of study at 42 may help them enter university later, as we have outlined in the Transformer model (see below). In the didactics of 42, learning processes are modeled on the work activities of programmers. For example, students use the tools and platforms they are likely to encounter in their first jobs. This approach blurs the strict separation between work and study. 42 is a direct reaction to the growing demand for software developers, which traditional universities cannot meet. As technologies are evolving rapidly, specific programming languages quickly become obsolete. The careful and therefore slow process of university-curriculum development cannot keep pace with such applications. However, for many jobs, companies do not expect a degree in computer science, but simply solid, basic knowledge (the "craft" of programming) and the ability to collaborate with others and continue learning.

42 enables students to acquire these key competences. In addition to programming, students develop skills such as self-learning and self-organization. Although these are not directly related to software, they will benefit the students in their professional lives and further studies. Although 42 aims to provide an innovative programming education, it also attaches great importance to skills such as adaptability, self-learning, creativity, and various other nontechnical social skills. These are exactly the skills that learners in the Jenga model need to create their own learning paths.

### **Case: MIT MicroMasters—Flexibility after the First Study Phase**

*Relevant for the models: Jenga, Lego, Transformer*

Since 2016, students who have successfully completed a series of online courses and then passed an exam under supervision have been able to spend slightly more than USD 1000 to acquire MicroMasters from the Massachusetts Institute of Technology (MIT). The first MicroMasters was developed for the supply-chain-management sector, where there was a growing need for experts

that traditional universities could not meet. For example, MIT offers only 30 students the option to take a master's degree per year on campus; this number cannot easily be increased (or decreased) from one year to the next. So MIT professors decided to offer their courses online, building a new type of degree.

Although the MicroMasters is not an "official" university degree, it is recognized as a learning achievement by some large companies and 22 universities in 16 countries. Overall, 40% of MicroMasters students have more than 5 years of work experience. MicroMasters students are in their early thirties, on average; approximately half of them already have a university degree. However, more than 20% come directly to the MicroMasters program without a previous degree. Completing the full MicroMasters program takes time, initiative, and motivation. For this reason, few students successfully complete all of the courses. To date, about 1300 students have received MicroMasters from MIT. However, this total is 20 times more than the number of students on the MIT campus who are working on supply-chain master's degrees. In addition, more than 30,000 students have completed at least one online module.

The aim of the MicroMasters program was to give more people access to knowledge and to create a new form of access to the traditional MIT Master's program. However, the results have been much more interesting. Today, not only does MIT accept MicroMasters when considering applications from potential students, other universities and even employers do the same. The MicroMasters program has simply put into practice something that was difficult to organize in theory—the mutual recognition of course achievements. For example, an MIT MicroMasters can be used to apply for 69 different master's programs at 22 universities around the world, while the online courses are credited. In just a few years, a global network has emerged that combines MOOCs with traditional university degrees in this way. Since two of the universities are located in Europe, this program automatically gives students access to the European Credit Transfer and Accumulation System (ECTS), as well as eligibility in many of the 48 countries of the European Higher Education Area (EHEA). Further study is not necessarily the goal of every student, and companies have also noticed the MicroMasters. For example, General Electric, one of the largest employers in the U.S., guarantees all applicants an interview if they have a MicroMasters. This is true whether they have a (regular) university degree or not.

In the Jenga model, a MicroMasters could be one of the study blocks needed to acquire and carry out a job. However, the case is also relevant to the Lego model, as a single study block among others, and to the Transformer model as an alternative path into higher education.

### 3.1.3 *Lego: Higher Education as a Kit*

#### **Lego**

*The course of study is not completed as a compact unit but consists of individually combined modules of different sizes.*

In this model, **students** are highly motivated and self-reliant and prefer an individual, non-standardized learning path that meets their learning needs and interests fully.<sup>5</sup> They combine various learning units, which are offered online and on-campus by different universities and new educational providers. The chain of learning units forms each student's personal study process. This model is also characterized by frequent changes between phases of employment and learning.

The central idea of Lego is to cater to a group of learners who are strongly self-motivated and able to create individual study programs that meet their own needs. This approach can succeed, at least for the time being, in professions in which specific skills, such as software development, are in more demand than professional qualifications. The primary aim is to acquire knowledge and skills that can be used directly for personal purposes. Learners may have different motivations for adopting this approach.

Lego students build their own individual study programs out of various learning units. They are supported by employers, representatives of occupational groups (who define occupational standards), and (where available) universities (and other service providers), which design learning paths, even for learners who may not be enrolled. In the best case, the **didactic design** of learning units takes into account the students' practical experience, appreciating that times spent not learning may have a significant impact on students' learning behavior.

The **recognition** of learning units depends on the general structure of recognition within the higher education landscape. For example, students can enter into a learning agreement with a single institution, based on learning outcomes that combine various learning units. However, it is also possible to combine learning achievements into an academic degree and to have them recognized, if necessary with certain conditions. In this way, people who cannot or do not want to make a long-term commitment in advance, for family or professional reasons, as in the Tamagotchi model, can nevertheless complete their university studies.

---

<sup>5</sup> At present, several models follow a similar approach. In Austria, for example, students can engage in "irregular studies" ("*Studium irregulare*"). However, these studies must correspond to a diploma, bachelor's or master's degree and "be equivalent to a relevant course of study;" see: <https://www.uni.at/studium/individuelle-studien/>. In Great Britain it is possible to obtain a so-called "open degree" from the Open University UK (Cooke, Lane, & Taylor, 2018).

**Case: DNB—Learning Culture as the Central Strategy of a Company***Relevant for the models: Lego, Transformer*

Universities do not play a major role in the ambitious (further) education strategy of DNB, Norway's leading financial enterprise. In the past, DNB sent a few hundred employees per year to bachelor's degree programs at traditional universities. Today, DNB has more than 9000 employees, who have constant free access to a vast amount of digital-educational content. Most employees decide for themselves what content they want to learn and how much time they want to invest in training. Instead of investing a relatively large amount of money in training a small number of employees, DNB uses digital technologies to reach out to all employees with a wide range of educational opportunities. DNB shows how the Lego model can be supported within a large business enterprise. At the same time, DNB also provides employees with many years of work experience and an introduction to a new type of higher education (the Transformer model—see below).

Almost all aspects of traditional financial business are changing rapidly, due to the use of digital technology. In future, sales staff will collaborate with chatbots to advise customers. The customers will be better informed and able to approach the company with clear ideas and wishes. To achieve this, employees must learn to use digital technologies for consulting and communication. However, it is no longer enough to have a single learning phase in the course of a whole life. Many fields of activity change continuously—faster than universities can develop suitable educational offers. Furthermore, DNB is not at all interested in its employees being able to obtain new university degrees; it wants them to be able to apply new competences and skills.

For DNB, learning is a strategic priority and part of its corporate culture. Educational innovation begins with technology—a user-friendly mobile learning platform, on which all DNB-selected learning opportunities are accessible—strategically anchored within the organization. DNB's Senior Vice President for Learning & Development meets with the management every six weeks to present results and approve new projects. In addition, the firm encourages workers to suggest new learning opportunities. Some meeting rooms can be quickly converted into "lounges," where employees can meet to learn together. If such innovative openness is lived across all levels of an organization, a new learning culture can develop. It is worth the effort since companies that are constantly learning are better able to benefit from the digital transformation of their industries.

The example of DNB shows that the increasingly narrow demarcation between work and higher education is likely to become a major driving force for change in the higher education system. DNB's strategic focus on education is still somewhat unusual. If Norway's leading financial institution is successful in its ambitious education strategy, however, other large companies can be expected to follow. Traditional higher education can support these processes by

providing flexible programs (while closely observing and exploring the latest developments in finance), but this requires more flexible educational provision and a new and open relationship with the economy.

The Lego model closes **gaps in the conventional range of training** offered by higher education institutions which, due to the dynamics of social change, are not covered by traditional bachelor's degree programs. The small-scale combination of different courses makes it possible for learners to respond to short-term demands and to acquire very individual qualifications. Although the DNB case (see Case: DNB) shows how this can be achieved from an entrepreneurial perspective, learning within the DNB system has not yet been recognized by the formal education system.

### ***3.1.4 Transformer: Higher Education as an Opportunity for Change***

#### **Transformer**

*The students in this model do not enter universities directly as school-leavers but have already acquired their own professional identities and life experiences, which they bring to their studies.*

In this model, schooling and the initial phase of education (possibly including higher education) have long since passed. **Learners** return to higher education either to acquire new basic knowledge and skills (side-skilling) or to improve their level of formal education (upskilling). They may be motivated by the need to prepare for a career change or to acquire higher qualifications. In this model, learners study relatively intensively over a period of three to five years and complete their tertiary education with the expectation of returning to or re-entering the labor market. The Transformer model enables individual learners to take advantage of opportunities to adapt their knowledge and skills profiles.

The central idea of this model is that, in the future, everyone must have opportunities to leave their chosen path in life and to change course. Options to participate in higher education and educational aspirations should not be determined by age or biography.

The **didactic concept** behind the Transformer model supports learning and personal development, through clearly defined steps and results. As learners begin higher education many years after leaving the formal education system, they need considerable support. At the same time, these learners have acquired knowledge, skills, and experience through their previous roles and can apply them to their learning. A careful

balance is therefore needed between academic support, guidance, and independent learning to achieve individual goals.

Universities are responsible for the **control and coordination**, and also the design, of the study program. The didactics take into account the knowledge, competence, and experience profiles of learners before they begin the course. However, credit for or recognition of previous achievements is rarely provided. Once progress has been made in this field, far shorter study courses should be possible. During the course of their studies, students acquire increasing control over their own learning paths; after an initial phase of the study, the proportion of **self-regulated learning** increases.

Learning takes place mainly on campus, with the support of global communication networks, simulations, and augmented reality techniques, which extend the learning environment through online experiences. Further learning spaces can be integrated into the learning experience through internships, makerspaces, and fablabs. Compatibility with the demands of work-life is achieved, above all, by extending the standard (maximum) period of study and by offering online course units.

Changes in the labor market represent an **essential driver** of the Transformer model, as they make it necessary for learners to expand their competence and knowledge profiles or to look for new fields of activity. Ultimately, this model offers a basic, work-life-oriented course of study that meets the needs of an older target group; its flexible study organization and didactic approach respond effectively to learners who may not have experienced active learning practice for many years.

## 3.2 A Detailed Analysis of the Models of Higher Education in 2030

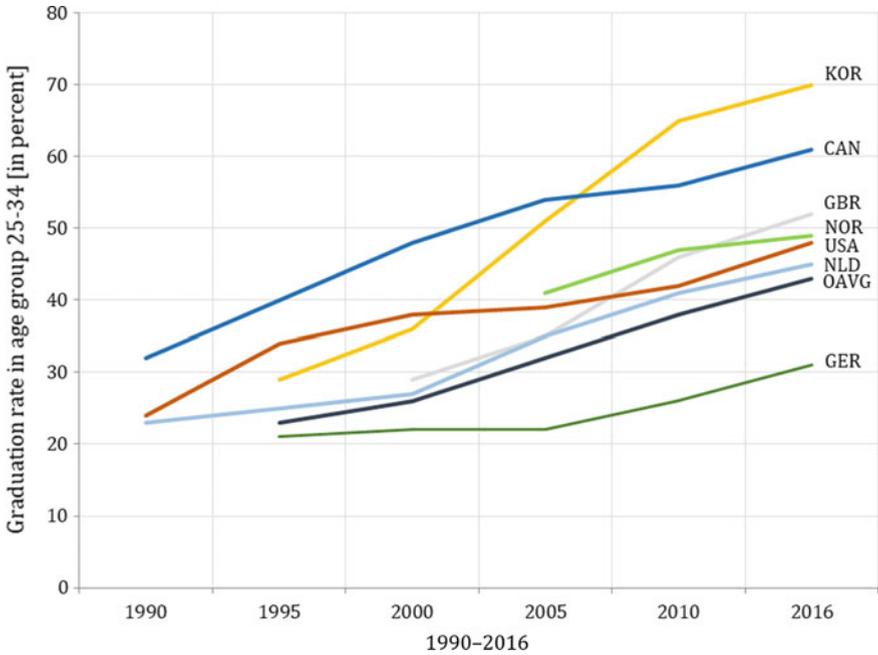
The following section describes the models in more detail, exploring central aspects identified in preliminary studies (see Sect. 2.1).

### 3.2.1 *Environmental Requirements and Models*

**Tamagotchi** corresponds to the current model of higher education. In relation to individual learner biographies, it fits between the completion of secondary education and the beginning of tertiary (higher) education. This model will still be relevant in 2030, primarily because of increasing demand for highly qualified employees. This will continue a trend that has been observed since 1990. Members of our society have an ever-higher level of education, with a graduate rate of over 40% in the OECD average for people in the 25–34 age group in 2016 (see Fig. 3.2).<sup>6</sup> Higher education remains a good investment for the state and for graduates who, among other things,

---

<sup>6</sup>Initial FiBS forecasts assume that the growth trend among first-year female students in Germany will continue until 2030.



**Fig. 3.2** Graduation rate in the 25–34 age group (selection of countries), 1990–2016. *Source* OECD database, population with higher education, ISCED 2011 5-8. *KOR* South Korea, *CAN* Canada, *GBR* United Kingdom, *NOR* Norway, *NLD* Netherlands, *OAVG* OECD average, *GER* Germany

earn better incomes and are less likely to become unemployed than nonacademics (European Commission/EACEA/Eurydice, 2018; OECD, 2018a). This pattern is likely to persist in a digitized world.

The Tamagotchi model focuses on providing basic knowledge and skills. If we assume that this is the only way to achieve higher (academic) qualifications, courses of study and programs must provide the knowledge and skills that learners need to transition to most high-level professions. Since this function can only be fulfilled to a limited extent if study programs change slowly, while the economy changes rapidly, debates about the “qualification deficit” and the “employability” of graduates will continue to challenge this form of higher education.

Economic developments and the interplay between economic dynamism in times of digitization and demographic shifts toward older populations suggest that access to higher education will need to be expanded. This model will not serve people who wish or need to study later in life. This is not a new challenge for higher education; it represents a line of action in the Bologna Process. However, the Tamagotchi model has not yet found an effective solution (Orr & Mishra, 2015). This model is therefore likely to cause further tensions, related to the question of whether university

providers can afford to ignore societal expectations to offer extended learning opportunities. New and more innovative formats must focus on didactics, the commitment of learners, and flexible learning paths (Unger & Zaussinger, 2018).

Although **Jenga** fills the same gap between secondary and tertiary education, the Jenga model addresses a slightly different future problem. There is already a trend toward academization in the health sector and education, among other fields. This trend will become stronger in the future, as occupational profiles are created in fields that correspond to intermediate or higher level qualifications. The Jenga model addresses this problem by offering a shorter initial period of study, while also considering “further education” from the perspective of the profession. In this way, it enables a learner with a bachelor’s degree in nursing to acquire an additional master’s degree in health management by completing study modules and blocks. The demand for employees with higher levels of professional competence, in addition to social and emotional competence, is sure to increase. Jenga provides a solution to the qualification problem. Complete study programs can be designed to develop basic levels of professional competence; learners can then acquire or enhance context-related competences in a reflective way while working.

For industries that are already knowledge- and research-intensive, Jenga addresses the growing need to constantly update knowledge and competences during periods of professional activity. Continuing education takes place in close cooperation with the Alma Mater and continues to have an academic character, which is characteristic of this labor market field.

**Lego** responds to the small but important segment of the labor market that is powerfully driven by innovation and new developments. Traditional courses of study are too slow in this area; this model is demand-oriented and cross-disciplinary, allowing learners to acquire knowledge and skills efficiently. This sector is likely to become more important in the future. Through additive manufacturing (such as 3D printing), it will soon be possible to design very lean and efficient production processes, which will enable even small companies to compete effectively. Such companies, which operate smaller and faster in the market, will value opportunities for their employees to gain selective internal qualifications. In addition, the development of products and services will place increasingly specific demands on knowledge and skills that can no longer be provided by individuals but must be provided by teams of people working together. Partial knowledge and competence gaps in such teams can be filled selectively, using the Lego model. The same requirements also apply to freelancers, who frequently work in virtual teams. In fact, some co-working spaces already offer educational programs (Horn, 2018).

**Transformer** addresses two major developments. On the one hand, career changes are becoming more frequent; on the other hand, demographic changes mean that older citizens need new educational opportunities in order to keep pace with changes in their roles and careers. Although Transformer is intended for learners who need close didactic control and coordination during their studies, it recognizes that older learners can draw on life and work experiences.

### ***3.2.2 Didactic and Technological Features of the Models***

The didactic starting points for **Tamagotchi** are a set of defined learning goals, which shape the curriculum and are taught to students. The first phase of education and the transition from school to university are important in this model. Future didactic support for learning processes can be improved through digitization. In the future, the selected teaching and learning methods will be evidence-based and congruent with learning objectives, in line with constructive alignment. By closely monitoring the learning process of the students, through many guidelines, handouts, and an optimal orchestration of different methods, Tamagotchi reduces dropout rates and increases success rates. The teaching is largely uniform and geared toward average students. Learning as a specific competence has already been acquired in school.

This model builds on the learning style prevalent in schools. New educational technologies are mainly used to develop optimal teaching/learning processes. As a result, digital media are added to regular teaching events, such as lectures, seminars, and exercises. Online versions of the bridge offer support learners during the introductory phase of their studies. Learning environments become the central control instrument. Models that predict learning outcomes, developed using artificial intelligence, offer improved adaptive learning experiences. However, the challenge remains to embed such innovations in the existing and restrictive framework of university governance and institutional culture.

From a didactic point of view, **Jenga** has two phases. The first phase is similar to the Tamagotchi model, although it focuses more on the transition between education and profession. In the second phase, learners search actively for offers, after successfully completing courses of study that have met their needs, both in terms of content and time flexibility. Higher education providers can thus build on a foundation of knowledge in the second phase, while also relying on the learning style learned during the first degree.

In contrast to the first learning phase, second-phase learning content is provided through differentiated and specialized modules, which become increasingly fragmented. However, the type of learning undertaken is based on Phase 1 of this model.

Tension arises in this model when higher education institutions want to attract their own alumni into Phase 2 studies (as with the MIT MicroMasters), but must respond to their former students' individual needs by providing knowledge and competence levels and more flexible forms of provision. While Tamagotchi offers a foundation of knowledge and competence, here learners want knowledge that is relevant to their current activities. Didactic offers from nonuniversities are likely to be competitive or even to have an advantage over those of established universities.

It seems logical that Phase 2 educational offers should move into virtual space, given the changed framework conditions of former students, who now have jobs and families. In these learning phases, attendance times must be reduced or even bundled.

As a result, technical requirements will increase. Institutions must prepare teaching and learning content for the virtual space, providing systems that enable online

learning phases and opportunities. Webinars, interactive videos, and virtual reality scenarios will be as commonplace as opportunities to virtually book, consume, and conclude these offers. Didactically, this model will open up new scenarios. Virtual tutoring and peer support will become far more important. This model will also require completely new organizational measures, to cope with digital certificates, digital payment systems, and a completely digital student-administration framework.

The predominant didactic principle in the **Lego** model is self-regulated learning. Learners actively seek offers that meet their needs, both in terms of content and methodology. Learning content is offered through more differentiated, specialized, and fragmented modules.

The predominant didactic principle in this model is each student's own identity and sense of "self." Students choose their own learning paths and compile individual curricula that reflect their own needs. As the research findings of distance-learning and continuing education studies have shown, time and time again, this model is a didactic prerequisite, since learners must have an established learning competence, as well as a willingness to learn.

At the same time, this model poses a challenge by relegating higher education institutions to the background. Educational providers are, above all, providers of individualized and individualizable learning spaces; they are also educational consultants. Digital tools will help students choose and organize their studies, and monitor their learning performance. This places the methods of learning analytics in the foreground. Digital platforms offer opportunities for national and international networking and exchanges with other students.

Certificates and digital proofs of competence (such as open badges) provide important documentation of learning performance (Orr & Buchem, 2019). The desire for security may foster the use of institution-independent storage locations, such as blockchain technology, for storing documents (Grech & Camilleri, 2017).

In the **Transformer** model, students have a wide range of prior knowledge that they can apply to their studies, and for which they may want recognition and appreciation. At the same time, the experience of learning in formal contexts is a distant memory; in most cases, this type of learning practice is no longer available. This model must, therefore, create a uniform ability to study, while also taking greater account of individual learning interests. It makes sense to engage participants in helping to define their own learning goals, adapted from the group. The exchange of and reflection on other experiences and backgrounds play an important role in this model. Individual lessons are tailored less to individual needs than to the interests of the group. The didactics must find a suitable balance between control and self-responsibility.

Since the content can be adapted to suit the current group of students, this model places the highest demands on the didactic competence of teachers. The Transformer model must also accommodate changes in learning by providing multifunctional learning spaces. Such spaces can be used flexibly, as traditional lecture halls, workshops, and group workrooms.

Given the average age of students, a high proportion of part-time learners can be expected. Attendance times must, therefore, be shorter than those in the Tamagotchi

model. In addressing technical challenges, a combination of the Tamagotchi and Lego models is likely to be formative.

Table 3.1 provides an overview of the didactic and technological features of the models.

**Table 3.1** Differences in the didactic and technological aspects of the four models

Differentiation criteria	Tamagotchi	Jenga	Lego	Transformer
Instructional design	Provided by the teacher	Provided by the teacher	Self-organized	Mixed, adapted to students but designed by teachers
Orientation of teaching content	Designed for the average student	Highly individual, but with a uniform starting point	Highly individual, with no uniform starting point	Collective, teaching content is adapted to a specific group of students
Student/teacher ratio	Students expect teachers to set and control the learning process	Students still expect significant input from teachers, but more in their professional role as experts than as classroom teachers. Students have greater personal responsibility for learning	Students control the learning process themselves and seek help from teachers when they feel it is necessary	Initially, the role of the teacher in the learning process is stronger; later the teacher is more important as an expert
Student group	Homogeneous	Heterogeneous	Extremely heterogeneous	Extremely heterogeneous
Technology	Enrichment in the classroom, educational data-mining, learning analytics for evidence-based learning	Enrichment model with 1:1 mirroring into the virtual world	Highly digitized	Hybrid form, high demands on multifunctional learning spaces
Digital learning scenarios (according to Wannemacher 2016)	Enrichment, game, and simulation	Integration, interaction, and collaboration, self-study, online learning	Personalization, self-study, online learning, open educational practice	Interaction and collaboration, open educational practice

Source Own illustration

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

