

# Applying the world's advanced models of cloud-based e-learning training to foreign language teaching at Vietnam universities today

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## KEYWORDS

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## ABSTRACT

E-learning is a common inevitable trend of the world education in the context of globalization, especially after the Covid-19 epidemic had broken out and has not yet completely ended. Currently, cloud-based training is growing more and more strongly in the background of the 4.0 technology revolution. Recognizing the importance of that issue, this paper studies some typical cloud-based e-learning training models in the world, and applies them to foreign language teaching at Vietnamese universities nowadays.

## 1. Theory on e-learning and cloud-based training

### 1.1 Basics of E-Learning

There have been many different corners of view on E-learning in the world. Elliott Masie gave birth to the term “*e-learning*” in 1999 while speaking at the TechLearn Conference at Disneyworld. Before this point of time, people used *online learning* with the same concept in mind. He made this phrase used professionally the first time: “E-learning is the use of network technology to design, distribute, select, administer and share learning.”

According to William Horton (2006), e-learning training was to use Web and Internet technologies for learning. In 1971, Horton designed technology-based training while he was opening some network-based course for MIT's Center.

By 2010, UNESCO defined e-learning as a learning process using electronic facilities, information and communication technologies; e-learning allowed everyone to learn anytime, anywhere, removing the limitations of time and space to give everyone the opportunities to study for their needs.

Author Tony Bates (2011) said that “e-learning was a convenient term to cover a range of uses of technology for teaching and learning, including all computer and Internet-based activities that support teaching and learning - both on-campus and at a distance.” He noted that “this term included administrative as well as academic uses of information and communication technologies that support learning, such as software that provided links between student data bases and teaching, for example, class lists, e-mail addresses, etc.”

MASIE Center (2014) defined that e-learning

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as the prepared learning or training, transmitting or managing the use of many different tools on information and communication technology; it was carried out at a local or global level. Compare Infobase Inc (2015) considered “e-learning as a term used to describe learning and training based on information and communication technologies.” In 2020, Sun Microsystems Inc said that “in e-learning, learning is transmitted or supported by electronic technologies; it is implemented through a variety of techniques such as Internet, TV, videotape, intelligent teaching systems, and computer-based training.”

Thus e-learning is simply understood as a method of using electronic devices, information and communication technologies to transmit content between teachers and learners. Among them, the devices are connected to a server that hosts electronic lessons through a certain software or platform. Lessons can be compiled in the form of videos, graphics, images and audios. As a global method, e-learning helps shorten spaces between countries and regions, lecturers and students; it is a fairly flexible method, and can be accessible anytime, anywhere. Also contents of lectures and test questions of e-learning are often diverse, covering many different topics of knowledge which are expressed on many multimedia formats such as images, clips, case studies, music videos... They have proven effectively in helping students to learn theory, core knowledge, and case studies/multiple choices/essays. They also help to improve visualization and ensure highest efficiency.

### *1.1.1. Advantages of e-learning*

Compared to traditional training methods, e-learning has following advantages:

+ Reducing time: teaching and training time will be reduced from saving travel and organizing periods ... Online training also helps to quickly set up courses for hundreds, even thousands of students at the same time without space and time restrictions.

+ Lowering costs: according to average statistics, e-learning can train up to 1000 students at the same time with the cost of approximately organizing one classroom for 30 students.

+ Saving facilities: compared to setting up traditional classrooms that requires rooms, tables, chairs, projectors, speakers, sound..., e-learning method secure teachers and learners to flexibly use the equipment available on computers and network

systems... at a much cheaper cost than usual.

### *1.1.2. Disadvantages of e-learning*

In addition to the above noted advantages, e-learning still has some of the following disadvantages:

+ Higher requirements for personal awareness: online learning at home, it is to get high results that students must be responsible and self-aware without their supervisors and lecturers.

+ New teaching and learning skills required: e-learning requires instructors to master technologies in designing courses, and learners must be at least proficient in skills related to software using.

## *1.2 Cloud computing*

### *1.2.1. Definition*

Cloud computing is mentioned a lot in the current 4.0 technology revolution because of its outstanding benefits. According to the IEEE (2019), “cloud computing was a model in which information is permanently stored at servers on the Internet and is only temporarily stored in clients, including personal computers, entertainment centers, enterprise computers, portable mobiles...”

In National Institute of Standards and Technology (NIST)’s opinion, “cloud computing was a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources that could be rapidly provisioned and released with minimal management effort or service provider interaction; this cloud model was composed of five essential characteristics, three service models, and four deployment models.”

IBM (2022) defined its cloud computing as following: “Cloud computing is on-demand access, via the internet, to computing resources—applications, servers (physical servers and virtual servers), data storage, development tools, networking capabilities, and more—hosted at a remote data center managed by a cloud services provider (or CSP); the CSP makes these resources available for a monthly subscription fee or bills them according to usage.”

Google (2022) said that: “Cloud computing is a term used to describe the delivery of on-demand computing resources—hardware, storage, databases, networking, and software—to businesses and

**Table 1. Characteristics of cloud computing**

Characteristics	Contents
On-demand self-service	“A consumer can unilaterally provision computing capabilities, such as server time and network storage, as needed automatically without requiring human interaction with each service provider.”
Broad network access	“Capabilities are available over the network and accessed through standard mechanisms that promote use by heterogeneous thin or thick client platforms (e.g., mobile phones, tablets, laptops, and workstations).”
Resource pooling	“The provider’s computing resources are pooled to serve multiple consumers using a multi-tenant model, with different physical and virtual resources dynamically assigned and reassigned according to consumer demand. There is a sense of location independence in that the customer generally has no control or knowledge over the exact location of the provided resources but may be able to specify location at a higher level of abstraction (e.g., country, state, or datacenter). Examples of resources include storage, processing, memory, and network bandwidth”
Rapid elasticity	“Capabilities can be elastically provisioned and released, in some cases automatically, to scale rapidly outward and inward commensurate with demand. To the consumer, the capabilities available for provisioning often appear to be unlimited and can be appropriated in any quantity at any time”
Measured service	“Cloud systems automatically control and optimize resource use by leveraging a metering capability <sup>1</sup> at some level of abstraction appropriate to the type of service (e.g., storage, processing, bandwidth, and active user accounts). Resource usage can be monitored, controlled, and reported, providing transparency for both the provider and consumer of the utilized service.”

Sources: NIST (2020)

individuals via a network (usually the internet). Cloud computing enables organizations to access and store information without managing their own physical devices or IT infrastructure.”

### 1.2.2. Characteristics of cloud computing

According to NIST (2020), cloud computing has some main characteristics:

#### 1.2.3. Advantages of cloud computing

According to Google (2022), cloud computing gave us many benefits. Among them are what we can summarized as following:

+ “Scalability and flexibility: Cloud computing gives businesses more flexibility. Companies can quickly scale resources and storage up to meet business demands without having to invest in physical infrastructure. They don’t need to pay for or build the infrastructure needed to support their highest load levels. Likewise, they can quickly scale down if resources aren’t being used.”

+ “Faster time to market: Users can spin up new instances or retire them in seconds, allowing developers to accelerate development with quick deployments. Cloud computing supports new innovations by making it easy to test new ideas and design new applications without hardware limitations or slow procurement processes.”

+ “Cost savings: Whatever cloud service model

customer choose, they only pay for the resources actually used. This helps them to avoid overbuilding and overprovisioning data center and gives IT teams back valuable time to focus on more strategic work.”

+ “Better collaboration: Cloud storage enables users to make data available anywhere they are, anytime they need, and from any device - as long as they have an internet connection.”

+ “Data loss prevention: Cloud providers offer backup and disaster recovery features. Storing data in the cloud rather than locally can help prevent data loss in the event of an emergency, such as hardware malfunction, malicious threats, or even simple user error.”

#### 1.2.4. Disadvantages of cloud computing

Referring to Google (2022) and Java (2022), the paper can explain some main weaknesses of cloud computing such as:

+ “Internet Connectivity: If you do not have good internet connectivity, you cannot access these data.”

+ “Vendor lock-in: This is the biggest disadvantage of cloud computing. Organizations may face problems when transferring their services from one vendor to another. As different vendors provide different platforms, that can cause difficulty moving from one cloud to another.”

+ “Limited Control: cloud infrastructures are completely owned, managed, and monitored by the

**Table 2. Service models of cloud computing**

Model	Contents
Software as a Service (SaaS)	“The capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited userspecific application configuration settings.”
Platform as a Service (PaaS)	“The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.”
Infrastructure as a Service (IaaS)	“The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).”

Sources: NIST (2020)

**Table 3. Deployment models of cloud computing**

Model	Contents
Private cloud	“The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers. It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.”
Community cloud	“The cloud infrastructure is provisioned for exclusive use by a specific community of consumers from organizations that have shared concerns. It may be owned, managed, and operated by one or more of the organizations in the community, a third party, or some combination of them, and it may exist on or off premises.”
Public cloud	“The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.”
Hybrid cloud.	“The cloud infrastructure is a composition of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).”

Sources: NIST (2020)

service providers, so the common users have less control over the function and execution of services within a cloud infrastructure.”

+ “Security: before adopting cloud technology, users should be aware that they will be sending all their organization’s sensitive information to a third party. While sending the data, there may be some chance that information is hacked by hackers.”

#### Models

About *service models*, there are some different classifications of service models for cloud computing. This paper explains the most familiar way to make the ideas clear: (NIST,2020)

About *deployment models*, there are four main ones: (NIST,2020)

#### 1.2.5. Applications of cloud computing

The applicability of cloud computing has been proven in many economic areas over the years,

bringing practical and even maximum benefits to users. Some applications can be mentioned such as:

- + Online Data Storage
- + Backup and Recovery
- + Testing and Development for webs, apps...
- + Big Data analysis and operating
- + E-commerce Applications
- + Cloud Computing for Education, Medicine

## 2. Some typical cloud-based training models in the world

### 2.1. Some cost-saving models

According to statistics of Intel (2022), “This technology-based training method saves 75% of the cost of organizing training, shortens 1/2 of the learning time, and increases efficiency by 2,5 times.”

A big problem when investing in facilities and equipments for teaching and learning at training organizations is the expensive costs of hardware and software, as well as the information technology staff costs especially for senior employees. Cloud computing offers much lower costs by providing Internet learning softwares using registered-accounts. Learners just need connect to the Internet, go to a web browser and log into their accounts. During the studying process, the system will automatically update software and hardware applications on all computers in the system, reducing the time and cost of hiring experts.

A typical model is the G-Suite toolkit for Education developed by Google. It is based on the cloud computing platform to provide schools and universities with some useful tools. Especially, they are free, including word processors (Word), spreadsheets (Sheet) and presentation (Slides)...

Microsoft offer a cloud computing version of the popular Office suite. Microsoft have provided their support by providing free access for students and teachers. Recently the corporation has just announced

to global customers a free training program on using the cloud computing tool Microsoft Azure. That program includes online general knowledge classes organized by Microsoft, applicable to customers using the company’s products and services. Microsoft commits that students will be provided with in-depth knowledge and skills to operate Azure software on any cloud computing platform. When the courses finish, students will be issued with corresponding certificates in digital formats. By the end of 2022, Microsoft Azure has been used by 85% of the Top 500 companies of Fortune. The operation is very simple, learners just need go to the training page at <https://openedx.microsoft.com/> to register to be able to participate.

### 2.2. Virtual classrooms

A great benefit of a virtual classroom built on a cloud computing platform is that it helps to reduce physical and administrative costs. Virtual classrooms have been developed since many years, but cloud-based virtual platforms make it easier for teachers to

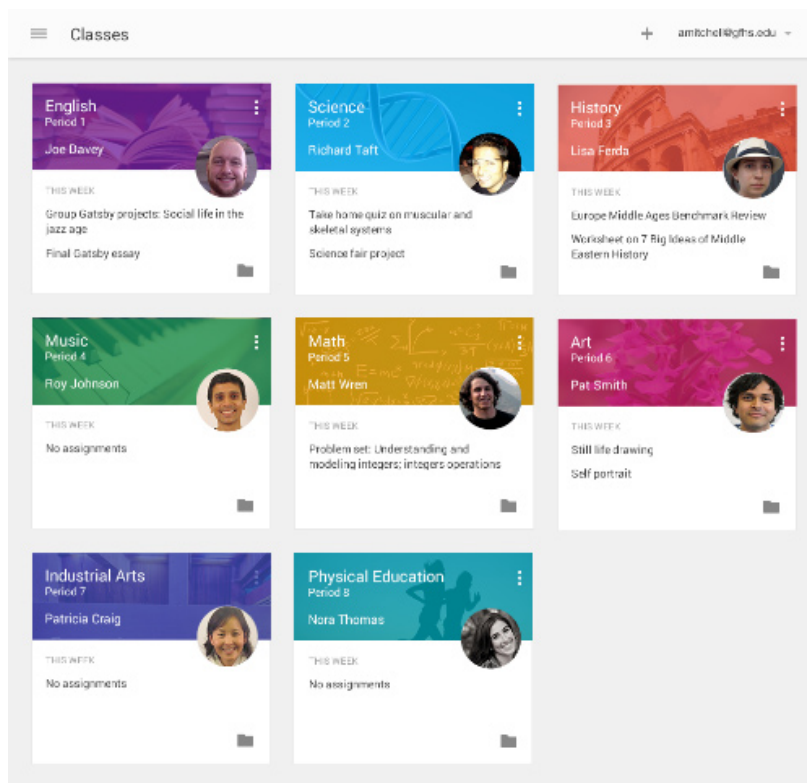


Figure 1. Classes are built and managed using Google Classroom

Source: Google (2021)

manage without installation costs. Virtual classrooms support lecturer to organize classes and courses automatically and fast; assist them to transfer study materials and assignments...

In 2014, Google started introducing the Classroom app in their G-Suite for Education. Then in 2016 Microsoft largely announced their own Classroom app. These famous solutions provide keys to support lecturers to manage their classrooms by using online applications similar to Word, Excel, and Powerpoint through a cloud computing platform.

### 2.3. Virtual Lab

In the past, the laboratory almost had to be held in the offline school, it was not possible to be online because the laboratory need direct instructions from the teacher as well as the equipment and tools only available offline. But now the cloud computing platform has solved this problem. A typical example is the virtual lab of CloudShare - a provider for virtual machines, allowing organizations to set up their own labs with a full range of support tools. Using CloudShare, they may create a number of virtual machines in the same virtual cloud-based environment, assigning them to learners, monitoring usage, and supporting learners when needed.

### 2.4. E-learning courses

E-learning courses are being developed more and more on the cloud platform. The MOOCs (emergence of extensive online classes) provides easy access to knowledge at fair prices, or free. In 2012, Andrew Ng and Daphne Koller, Stanford University professors, launched Coursera - a platform that offered e-learning courses in many fields. Coursera includes data science, computer science, or more complex fields... Until 2020, the Coursera platform has offered over 3000 courses, reaching around a million registered people all over the world.

Not only university but also high school education has been developing cloud computing. EdX, a platform built by Harvard University, was born in 2014. Today it has grown worldwide and helped children around the world to be able to access to American education.

### 2.5. Combining Cloud Computing with Artificial Intelligence

According to experts, the inevitable trend of education will be its combination with AI (artificial intelligence), based on cloud computing technology. By using a huge collected data and superior algorithms, AI can look for weaknesses of the whole process, promoting the advantages and limiting the disadvantages. Educators and students deal with separate issues. Most cloud platform providers have taken their first steps or considered integrating AI-powered tools into their training solutions.

Educational experts predict that "by 2025, global demand for university education will double from today, around 200 million students a year, many of which come from emerging economies". In the context of growing e-learning teaching and learning today, it is essential to have a combination of cloud computing and AI to process a large amount of information in global educational training.

## 3. Applying the models of cloud-based e-learning foreign language teaching at Vietnam universities

### 3.1. The need of cloud-based e-learning for education

Along with the development of society, in the context that the world activities were freezed in the past few years due to the impact of the Covid-19 pandemic, it is clear that e-learning training plays an important role more than ever. However, investing in building a large-scale online training system will require a lot of effort and cost very much. There are very expensive costs to cover, such as hardware, training management software, infrastructure, production and maintenance ... Costs like that are out of the capability of many Vietnamese universities today. Due to the development of the Industrial Revolution 4.0, the application of cloud computing technology into online training activities is an important solution to solve the above difficult problem.

According to Dr. Astrid Tuminez (2017), Senior Director of Cooperation, Foreign Affairs and Legal Affairs of Microsoft, Asia zone, every industrial revolution has been driven by a breakthrough invention such as the steam engine, internal combustion engine, microprocessor; in the 4.0 revolution, it is the cloud computing of huge data centers brings everything within reach with just one internet-connected device.

Mr. Nguyen Dinh Thang (2020), Vice Chairman of

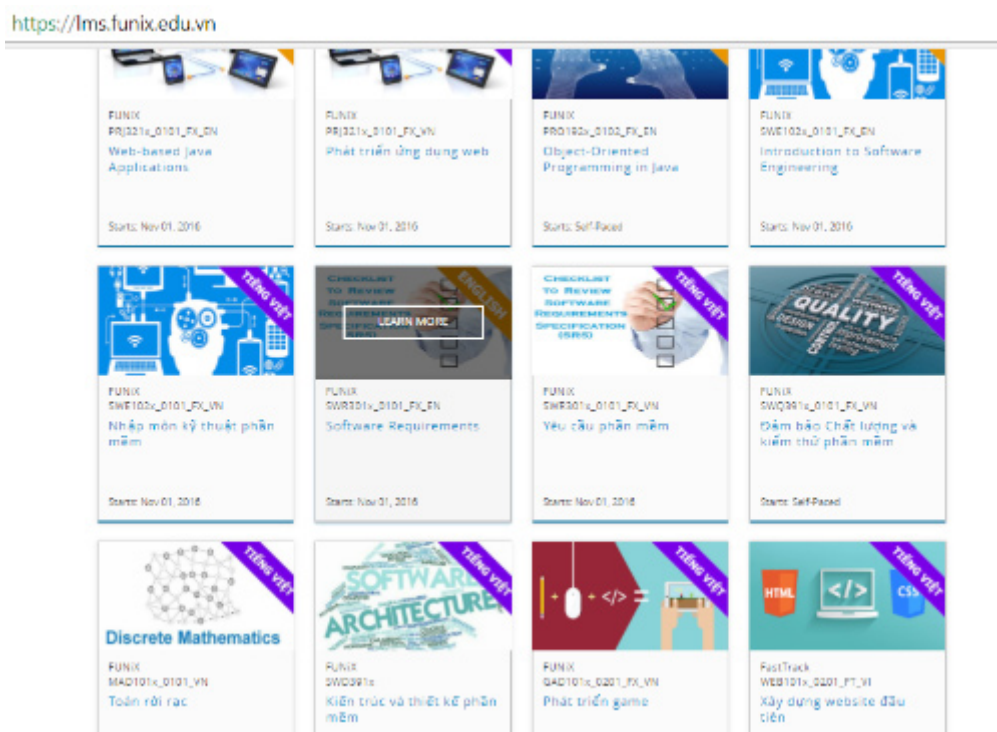


Figure 2. Online courses of Funix Online University

Source: Funix (2020)

Vietnam Software and IT Services Association, said that “cloud computing brings many benefits such as: standardization of products and services, minimizing investment costs, shortening product development time, improving service quality, flexible business models, and be ready to expand when needed.”

Today, the trend of training in universities in general, and foreign languages in particular, has been gradually shifting from traditional training to e-learning training on the cloud computing platform, due to a series of outstanding benefits such as shortening the geographical distance, lowering training time, saving costs...which thank to the absence of organizing, facilities, and personnel. Some of those useful applications can be listed as follows.

### 3.2. Some advanced cloud-based e-learning models for foreign language teaching at Vietnam universities

#### Student data management

Cloud computing technology has been initially applied in student data management at some universities in the North and the South of Vietnam. This technology provides users with information technology resources similar to services on internet

clouds.

By using cloud computing, foreign faculties and departments can access the data management services anytime, anywhere and almost situations. Databases of schools, lecturers and students are kept on a large network, easy to access and search. They do not need to spend a lot of effort and maintenance costs, that is taken care of by a team of network engineers.

#### E-learning language classes

The outstanding and much-needed advantage of cloud-based learning platforms is their ability to provide anyone with a fully-equipped Internet-connected classroom to study a foreign language: lesson slides, learning materials, foreign language robots, listening and speaking software, virtual assistants gradually improving pronunciation... An advanced platform create a seamless environment where students can study comfortably at their own speed, doing assignments and projects on any device and anywhere. In addition, learning results can be assigned to the grading machine, that ensure fairness and science in the transcripts having the appropriate coefficients for each question, and keep privacy for each student in order that they don't feel afraid if they had made some mistakes in the process of checking their actual level of knowledge.

In Vietnam, FUNiX Online University has built and developed an e-learning platform on cloud computing which allow students to be completely online with materials of MOOCs. Students also receive the support of a team of mentors who are technology experts throughout their learning process.

#### 4. Conclusion

If e-learning is the trend of modern society that bring many benefits to both lecturer and students in Vietnam universities, then cloud computing is an effective support tool for online training. With this platform, users can have unlimited storage space, use virtual utilities that simulate real life, without spending too much costs on operating and managing classrooms. We hope that the application of cloud-based e-learning foreign language training models to universities in our country will develop more and

more, on the basis of inheriting the world's advanced models and using advanced technologies which are suitable for Vietnam specific situation.

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