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雲端託管多媒體網站之設計與運作有助於自主式ESL學習

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摘要

互聯網是學習與獲取知識的廣泛使用通道，無處不在的網絡連結能提供即時訊息與廣闊學習材料。同樣，網上學習已成為自主式ESL（英語作為第二語言）學習的重要工具，包括「電腦輔助語言學習」(CALL)、自主學習(learner autonomy)在內的許多學習方法已充分運用現代的互聯網技術。近年來，資訊科技(IT)已推展至更高效率的雲端運算、移動互聯網運作，Web 2.0與視頻暢流技術已產生普遍流行的視頻服務例如YouTube。現代互聯網技術、雲端運算、Web 2.0媒體、自我導向英語學習等方法已整合成為一個具吸引力的組合。本論文提出一種利用雲端託管的多媒體網站有助於ESL學習的示範，使雲端運算與雲端託管的優勢得到充分利用。由於協作式Web 2.0的YouTube服務已產生出大量的英語學習視頻，我們設置的雲端網站內容包含大量嵌入式、反應迅速的YouTube視頻。因具有豐富內容與使用者方便的媒體功能，我們有理由相信這個網站是一個有效率的模式應用於自主式ESL學習。

關鍵詞：雲端託管，互聯網，多媒體，自主式學習，ESL。

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Design and Implementation of Cloud Hosting Multimedia Website to Facilitate Autonomous ESL Learning

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Abstract

The Internet is a widely-used channel for learning and knowledge acquisition. Ubiquitous web connection can provide instant information and vast learning material. Likewise, online learning has become a crucial instrument for autonomous ESL (English as Second Language) learning. Learning methodologies, such as Computer Assisted Language Learning (CALL) and learner autonomy, have taken advantage of modern Internet technology. In recent years, Information Technology (IT) has advanced to even more efficient operation of cloud computing and mobile Internet. The Web 2.0 and video-streaming technology have produced popular video services such as YouTube. The integration of modern Internet technology, cloud computing, Web 2.0 media, and self-directed learning of English becomes an attractive combination. This paper presents a demonstration of using cloud hosting multimedia website to facilitate the ESL learning. Advantages of cloud computing and cloud hosting are fully utilized. Since the collaborative Web 2.0 YouTube service has generated a plethora of English learning videos, the installed cloud website contains a large amount of embedded YouTube videos that exhibit rapid streaming response. With rich content and user-friendly media features, we justifiably believe that this website is an efficient model for autonomous ESL learning.

Keywords: Cloud hosting, Internet, multimedia, autonomous learning, ESL.

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Introduction

In the globalized world, competence in a second language (L2) such as English is often as important as other basic skills in life. Electronic learning (e-learning) has long been a popular method in ESL (English as Second Language) or L2 learning. With the rapid development of information technology, the Internet has become a convenient and effective channel for learning and knowledge acquisition **[1, 2]**. Widely-available Internet provides unlimited resources of information and learning material. The advantages of online learning have stimulated investment by numerous technology firms competing to meet demands for software and other important applications. As a result, the availability of online education has grown exponentially in recent years. Online learning can be as simple as teachers posting learning materials for students to retrieve or study. Advanced e-learning becomes increasingly interactive, and offers more applications and multimedia content for improved learning experience. In 2004, about $7 billion was spent developing the online learning market, according to a study by a U.S. research firm International Data Corporation (IDC). The firm also found the amount spent was expected to increase almost 30 percent each year during the subsequent four years **[3]**. IDC stated that the revenue from synchronous e-learning exceeded $5 billion by 2006 **[4]**.

The continuous growth of online learning market stimulated discussion regarding efficient learning methodology. With the proliferation of computers and Computer Assisted Language Learning (CALL), the real watershed came with the arrival of broadband Internet service. Slower and less reliable dial-up connections could not meet the demands of educational content. The evolution of Internet technology has resulted in the streaming media. Streaming media is an efficient method to deliver video material, since streaming technology enables large video files to begin playing before the entire file has been downloaded **[5]**. This produces instant multimedia video response in webpage and a more interactive online learning environment. Examples of multimedia content are text, audio, still images, video footage, animations, and computer interactivity. They can be integrated into an e-learning system. The richness of multimedia presenta-

tion and their easy maneuvering will certainly enhance the perceived usefulness of online learning experience. Thus it is very desirable to have ESL learning content filled with multimedia videos that can be instantly shown with a click of mouse.

Online learning has become an important and essential instrument for autonomous learning of English. Web-Based autonomous learning offers a new learning platform for college students and it has drawn worldwide attention both in theory and in practice **[6]**. It brings opportunities for students to overcome the limitation of traditional teaching mode. Students can easily acquire a wealth of useful learning material such as news, text, and audio-videos. The advancement of broadband technology has contributed to the creation of high-speed web connection, fast video streaming, and mobile Internet. This makes the Internet usage for instructional purposes expanded rapidly. Online learning is now shifting toward mobile learning in which learning can happen at anytime and anywhere. The intrinsic motivation lies in that online learning is more cost-effective and easier to access than the conventional classes. Traditional classroom teaching may be partially supplemented or even totally replaced by either interactive or non-interactive online learning. To save costs and time, many organizations have used online learning to supplement their traditional teaching or training programs. This and other types of combined learning are also called "blended learning" **[4, 7]**. Blended learning includes mixed forms of learning, such as face-to-face classroom teaching, live e-learning, synchronous online conferencing or training, and asynchronous self-paced web-based learning. The concept of blended learning reflects the fact that learning is not just a one-time event, but it is a continuous process. Blending provides benefits over using any single learning medium alone.

The second phase in Web's evolution is the so-called "Web 2.0", this phrase was coined by Tim O'Reilly in 2004 **[8]**. The term Web 2.0 has become highly popular for describing a new era of Web services and applications that let users easily share opinions and resources. Web 2.0 harnesses the Web in a more interactive and collaborative manner, and it presents new opportunities for leveraging the Web and engaging its users more effectively. Web 2.0 represents a shift in how people use the Web. In Web 1.0, most users were limited to passively viewing websites created by some providers with

markup and programming skills. In Web 2.0, users can contribute and share the web content online. The Web 2.0 is also called the wisdom Web, people-centric Web, and participative Web. Users can collectively contribute to a Web presence and generate massive content with their collaboration. The Web 2.0 presents a revolutionary way of gathering, organizing and sharing of information. Successful and well-known examples of Web 2.0 social applications are Google, Weblogs, Wikipedia, YouTube, MySpace, Facebook, Flickr and Second Life. They have been forging new applications and business model on the Internet. It has been shown that serving multimedia content over the Internet with negligible delay time is a very desirable feature. In the era of Web 2.0, numerous such video sharing sites have become popular. Especially, the fast-streaming multimedia services, such as the popular YouTube video **[9]**, have created an excellent learning environment for all types of learners.

The Internet is on the verge of another revolution, where resources are globally networked and can be easily shared. Computing resources have become cheaper, more powerful and more readily available than ever before. This trend has enabled the realization of a new computing model called "cloud computing" **[10, 11]**. Cloud computing has emerged as a new Internet paradigm for hosting and delivering Web services. It is attractive to business owners because it eliminates the requirement for users to plan ahead for provisioning, and allows enterprises to start with little or no investment and increase resources only when service demand rises. In the past few years, cloud computing has made a tremendous headway in IT industry and large companies such as Google, Amazon and Microsoft strive to provide more powerful, reliable and cost-effective cloud platforms. The advantages of cloud-based operation for business owners include no up-front investment, lower operating cost, highly scalable, easy access, reduced risk and low maintenance expenses **[12]**.

In view of the above advancements and evolution of e-learning, this paper presents a demonstration of using a cloud hosting website and its streaming multimedia content to facilitate ESL learning. To elaborate on the language learning model, this paper probes into the relationships among motivation, andragogy (adult education theory), learner autonomy, self-directed learning, and CALL. The advantages of cloud

computing and its website hosting are described. Effective English learning offered by multimedia content in the installed website are also described. In Section 2 of this paper, the concept and research of motivation, learner autonomy, and self-directed learning are discussed. The importance of motivation and autonomous language learning and the benefits therefrom are thus illuminated. In Section 3, a brief background review of cloud computing and advantages of using cloud hosting are described. The configuration, design considerations, and learning content of the installed cloud website are illustrated in Section 4. Since YouTube videos were embedded in the webpage, the performance comparison of YouTube with other video stream services is also described in Section 4. Finally, the contribution and conclusion are described in Section 5.

Learner Autonomy and Self-Directed Learning of ESL

Motivation and Learner Autonomy

Motivation has long been regarded as a key factor in determining achievement and success of English as Second Language (ESL) learning. Motivation creates the desire and impetus to learn, and vice versa. Learning of ESL requires practice and persistence. Motivation serves as a driving force to sustain the long process of acquiring a foreign language. It is likely that most learners with strong motivation can achieve an adequate working knowledge of ESL, irrespective of their language aptitude or learning conditions. On the other hand, a very smart learner is likely to fail to achieve ESL proficiency because of not having enough motivation. Due to its great importance, motivation in ESL or L2 learning has been the subject of considerable amount of research in recent decades **[13]**, exploring the nature of this complex construct and how it affects the L2 learning process. Researchers in social psychology and education have recognized the importance of motivation for successful L2 learning **[14]**. There are cognitive factors involved such as language aptitude and intelligence as well as affective factors such as attitude and motivation. In fact, the affective factors, including attitude, orientations, anxiety, and motivation have been shown to be at least as impor-

tant as language aptitude for predicting L2 achievement **[15]**. It is fair to say that language aptitude is only part of the equation to successful L2 learning.

Individual's motivation to learn an L2 is usually sustained by attitudes toward the L2 community and the goals sought through the acquisition of the L2. The goals, or orientations, refer to a desire to learn the L2 in order to have contact with members from the L2 community. There is also the instrumental orientation which refers to a desire to achieve some practical objectives, such as job requirement or course credit. Consequently, individuals with an integrative orientation are likely to have a greater motivation in learning an L2 and achieve better L2 competence. Strategies to motivate language learners should be seen as an important aspect of the theoretical analysis of L2 motivation **[16]**.

According to self-determination theory, there are two general types of motivation, namely, intrinsic and extrinsic motivations **[13, 17]**. Intrinsic motivation refers to motivation to engage in an activity which is enjoyable and satisfying to do, due to intrinsic interest in the activity. In contrast, extrinsic motivation is based on actions to achieve some instrumental purpose, such as making money or avoiding punishment. Be it intrinsic or extrinsic motive, motivation is surely an essential driving force to attain successful L2 learning. In this paper, we are to elaborate and show that, everything else being equal, favorable learning setup and medium are conducive to successful L2 learning of English. Besides, affective factors such as attitude, orientations, anxiety and motivation, may be influenced by interesting and favorable learning condition and sources.

Similar to the motivation, learner autonomy is another crucial factor in L2 learning. Learner autonomy in English language learning has been regarded as an important principle and effective instrument since the 1980s **[18]**. The principle of learner autonomy is the ability to take charge of one's own learning into their practice. Autonomous learners are likely to take the responsibility of setting their own goals, planning their practices, and accessing their progress. It is almost universally agreed that language learners can benefit significantly from developing an autonomous approach to their learning **[19, 20]**. Since motivation is essential for learning process, a common belief

is that autonomous learners can become more highly motivated and lead to more effective learning. Likewise, proactive learners who take the initiative in learning would learn more and better than those reactive learners who behave passively waiting to be taught.

Promoting learner autonomy can also be justified on pedagogical grounds, because adult learners demonstrably learn more, and more effectively, when they are consulted about the pace, sequence, type of instruction and even the content of learning material **[21]**. A common justification for the use of computers in language learning (CALL) is that it is said to promote learner autonomy, which both researchers and practitioners now set as a very important goal. Learner autonomy results in more effective and proficient learning, in which the learners accept full responsibility for the learning process and the learning depends crucially on themselves rather than on other people. In other words, taking an active and independent attitude on learning and personal involvement in decision making would lead to more effective learning. In college and adult school settings, CALL depends to a great extent on the active role of teachers to promote and facilitate learner autonomy of L2 learning. As a result, L2 learners' active involvement in their own learning increases motivation to learn and, consequently, increases learning effectiveness. What is left to prepare for autonomous learning is the rich content of effective learning material.

Andragogy and Self-Directed Learning

In addition to learner autonomy, another core theoretical construct distinguishing adult education as a field of study is the self-directed learning. Sometimes, it is also called independent learning, self-initiated learning, self-motivated learning, or autonomous learning. Self-directed learning has a long history in the U.S. The perception of America as a land of opportunity, where an individual could progress based on personal initiative, ability, and effort created a fertile field for the promotion of self-directed learning **[22, 23]**. Back in the Colonial America, self-education was already commonly practiced. The 1970’s were an exceptionally growing period for the research and writing on the subjects of self-directed learning. In 1968, American educator Malcolm

Knowles proposed “a new label and a new technology” of adult learning to distinguish it from preadult schooling, or it is andragogy vs. pedagogy **[24]**.

The word “andragogy” was originally used in Europe in 1833, but it was popularized by Knowles in the 1970’s and 1980’s. Andragogy was defined by Knowles as the art and science of helping adults learn. The term “andra-gogy” literally means “adult-leading.” Knowles’ concept of andragogy is built upon two major attributes. The first is a conception of learners as self-directed and autonomous, and the second is a conception of the role of the teacher as facilitator of learning rather than presenter of content, emphasizing learner choice more than expert control. Andragogy was contrasted to pedagogy, the latter was defined by Knowles as the art and science of helping children learn **[25]**. Andragogy then became a rallying point for those who trying to define the adult education as a separate field from other areas of education.

Figure 1 shows a concept mapping of pedagogy and andragogy for L2 learning of English. Pedagogical learning experiences are more teacher-directed. The learning content is mostly prescriptive as used in traditional schooling. These learners expect the teacher to guide their learning, and to assess their learning progress. Pedagogy is characterized as teacher-focused education and reactive learning. Thus, pedagogy is mainly used for children and teenagers. Pedagogy generally lacks the impetus of learner autonomy. In contrast, the practice of andragogy is more learner-centered and the teacher is more like a facilitator. Andragogy is characterized as self-directed learning, learner-focused education, and proactive learning. Andragogy prepares learners for motivated learning. Thus it is mainly used for adult education or adult learners. Andragogy is especially applicable to the current era of e-learning where Internet technology provides machine intelligence and unlimited learning material. In the context of this paper, the component of “online learning” in Figure 1 consists of multimedia content, streaming video, and interactive web. These features are contributions of this paper and they are conducive to accomplish effective and self-directed online L2 learning of English.

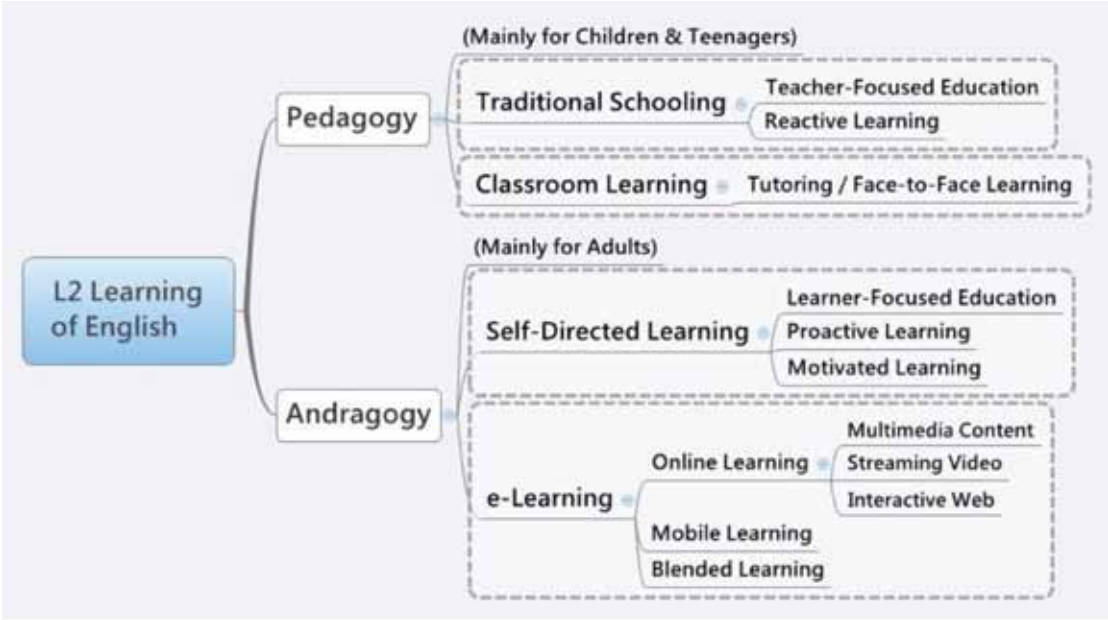

Figure 1. A proposed concept mapping of pedagogy and andragogy for L2 learning of English.

However, there were criticisms on the andragogical concept, as might be expected with any new concept or discipline **[26, 27]**. Andragogy has had its opponents as well as its proponents. Much of the controversy stems from differing philosophical orientations, classification, and general utility of the term for adult education. Discrepancy usually can be found from exceptions to the rule, let alone a social psychological concept. For example, the above learning descriptions were not necessarily true for all adults and children, since some adults are highly dependent on teacher for learning, while some children are independent, self-directed learners. Likewise, the same is true for motivation, since some adults may be externally motivated to learn, as in attending job trainings or taking examinations, while some children may be motivated by curiosity or intrinsic pleasure of learning. In short, andragogy consists of learning strategies for adult learners and it remains as learner-centered pattern of adult education. Andragogy has contributed to the understanding that educators should involve learners in many aspects of their education and create a climate in which fruitfully learning can occur.

Self-directed learning (SDL) was initially claimed by Malcolm Knowles (1975) to be a universal disposition of adult learners who were judged to exhibit an increasing tendency to self-directedness **[28, 29]**. In his view, facilitating self-direction should be the primary goal of adult education. If adults were skilled in this mode of learning, they would be well equipped to live in the Internet Age where workers are continuously retrained for new skills. Self-directed learning may well be the most prominent and well researched topic in the field of adult education **[30, 31]**. To illustrate the term's widespread use, as of today, the "Google" search engine reveals 11 million entries for "self-directed learning", as compared to 2.6 million entries for searching "computer assisted language learning." Several reasons have been proposed to explain the popularity of self-directed learning. The obvious one is cost-saving and spending reduction. Blended learning can be offered with the assistance of e-learning. Students are usually capable of managing their own e-learning without professional educators.

Self-directed learning is strongly influenced by a number of variables, such as personality type, the learner's previous experience, the availability of relevant resources, and perceived cultural constraints or enhancers. Self-directedness is not considered as an innate capacity of learners. In Figure 2, we have proposed a diagram of various factors that influence L2 learning of English. Some of the factors such as learner's motivation, language aptitude, and self-directed learning, have been described in this paper. The social context factor refers to the circumstances such as learning environment, classroom dynamics, opportunity for interactions, and students' perception of the teacher. It is important to know that many of the influencing factors are interrelated. For example, poor learning condition and learning process may have a negative impact on the learning results which in turn may decrease the learner's motivation, and vice versa. With recent advancement of broadband technology and Web 2.0, the capability and resources on the Internet have reached a new height, and self-directed learning plays an even more important role for effective L2 learning. In terms of contribution of this paper, our implementation of the cloud website is to improve the learning condition and learning process, which in turn makes the L2 learning more efficient and rewarding. It thus facilitates the learner autonomy and self-directed L2 or ESL learning.

Figure 2. A diagram of factors that influence L2 learning of English.

Cloud Computing and Cloud Web Hosting

Cloud Computing

With the rapid development of Internet and storage technologies, computing resources have become cheaper, more powerful than ever before. Cloud computing has recently emerged as a new paradigm and technology trend for hosting and delivering services over the Internet **[32, 33]**. The term "cloud", a metaphor for the Internet, was likely derived from IT textbook illustrations in which remote environments, especially the Internet, were often depicted as cloud images. There are more than 20 definitions concerning the term "cloud computing" **[34]**. No common standard or definition for cloud computing seems to exist **[35]**. However, the commonly accepted definition seems to be that clouds are clusters of distributed computers, such as vast data centers and server farms, which provide on-demand resources and services over the Internet. By NIST's definition, cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and re-

leased with minimal management effort or service provider interaction.

Cloud computing is the delivery of computing as a service rather than a product, such that shared resources, software, and information are provided to computers and other devices as a metered service over the Internet. Cloud computing is also a marketing term for enterprises that provide computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the service system. At the foundation of cloud computing is the broader concept of infrastructure convergence. This type of data center environment allows enterprises to get their applications up and running faster, with easier manageability and less maintenance. Most cloud computing infrastructures consist of services delivered through shared data-centers and appearing as a single point of access for customers' computing needs. Information and computer power can be accessed from a Web browser by users and customers. Resources such as CPU and storage are provided as general utilities that can be leased and released by users in an on-demand fashion. Cloud computing eliminates the requirement for users to plan ahead for provisioning, and allows business to start from small and increase resources when service demand rises.

Figure 3 shows a diagram to graphically depict the concept that cloud computing is the future of Internet technology. Included in the diagram are various big-name commercial companies that are currently investing heavily in cloud computing. The key features of cloud computing are the virtualization, distribution, and dynamically extendibility. In cloud computing, the Internet service provider is divided into two: the infrastructure providers who manage cloud platforms and lease out resources, and service providers, who rent resources from one or many infrastructure providers to serve the end users. Big enterprises and vendors like Google Cloud Services, Amazon Web Services, Microsoft's Windows Azure, and Salesforce.com seek to provide powerful, reliable and cost-effective cloud platforms, and business owners try to gain benefit from this new service model **[36]**. The cloud can quickly scale to thousands of servers to make resources available as they're needed. Cloud computing is rapidly changing the landscape of information technology, eventually it may turn the promise of utility computing into a reality.

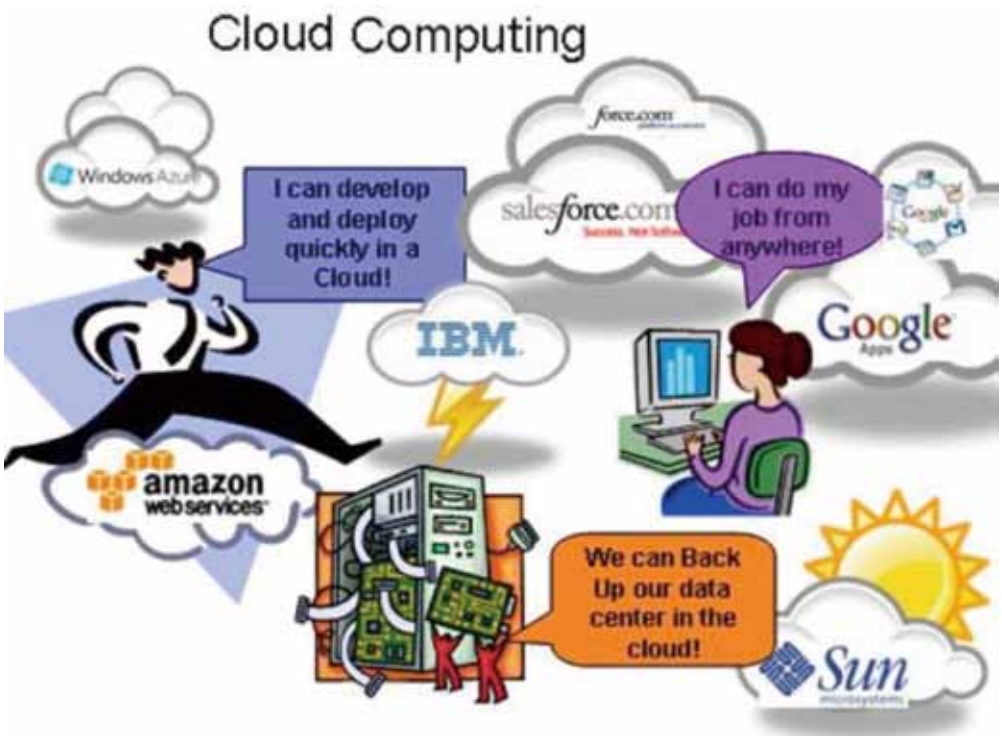

Figure 3. Cloud computing is the future of Internet technology. Various participating vendors are listed in the diagram.

To summarize, cloud computing has the following important characteristics. Most of these features are attractive to business owners or users.

(1) Empowerment. End-users of computing resources are empowered by putting the provisioning of those resources in their own control, as opposed to the control of a centralized IT service.

(2) Agility. Users' ability to re-provision technological infrastructure resources is more agile.

(3) No Up-front Investment: Cloud computing uses a pay-as-you-go pricing model. A service provider does not need to invest in the infrastructure to start benefiting from cloud computing. It simply rents resources from the cloud according to its own needs and pay for the usage.

(3) Lowering Operating Costs. Operating costs are expected to be reduced. In a public cloud delivery model, capital expenditure is converted to operating ex-

penditure. Resources in a cloud environment can be rapidly allocated and de-allocated on demand. Thus a service provider no longer needs to provision capacities according to the peak load. This provides savings on operating costs since resources can be released when service demand is low.

(4) Easy Access. Cloud computing enables the user to access systems using a web browser regardless of their location. Services hosted in the cloud are generally web-based. They are easily accessible through a variety of devices with Internet connections. These devices include desktop computers, smartphones, and tablet devices.

(5) Multiple Tenancy. This characteristic enables sharing of resources and costs across a large pool of users. It results in centralization of infrastructure in locations having lower costs, peak-load capacity increases, and utilization and efficiency improvements for systems that are only partially utilized.

(6) High Reliability. The use of multiple redundant sites improves reliability. Cloud uses data multi-transcript fault tolerant, the computation node isomorphism exchangeable to ensure the high reliability of the service. This makes well-designed cloud computing suitable for business continuity and disaster recovery.

(7) Highly Scalable. Dynamic or on-demand provisioning of resources on a fine-grained, self-service basis near real-time provides system scalability. A service provider can easily expand its service to large scales in order to handle rapid increase in service demands.

(8) Security. Security could improve due to centralization of data, but concerns can persist about loss of control over certain sensitive data, and the lack of security for stored kernels. Security is generally as good as or better than that of traditional systems, in part due to providers are able to devote resources to solving security issues that many customers cannot afford. However, the security issue persists when data are distributed over a wider area or greater number of devices and in multi-tenant systems that are being shared by unrelated users. Private cloud installations are in part motivated by users' desire to

retain control over the infrastructure and avoid losing control of information security.

(9) Maintenance and Risks. The maintenance of cloud computing applications is easier, because they are not installed on each user's computer. By outsourcing the service infrastructure to the clouds, a service provider shifts its business risks to infrastructure providers, who often have better expertise for managing these risks. A service provider can cut down the hardware maintenance and the staff training costs.

Cloud Web Hosting – A Cost-Effective Solution

Cloud computing is impacting the modern Internet computing and businesses. Convenience and cost saving are advantages of using the services offered by the cloud. Figure 4 shows a diagram of evolution of Web hosting moving form the old ISP 1.0 toward ISP 5.0 of cloud computing. An Internet service provider (ISP) is a company that provides access, or connects customers, to the Internet. “Hosting ISPs” lease server space for smaller businesses and host other people servers. Cloud web hosting is a business related concept, which makes IT resource provisioning to the end users of different companies from a centralized location through a network or internet connection. Cloud web hosting is a service that provides cost-effective and hassle-free solution to small businesses’ IT requirement. The requirement includes purchasing of networking hardware, application software, data backups and equipment upgrades. A business or company needs only a terminal with minor processing power to access the cloud web hosting resources and all the other functions are carried out at distant centralized location. The cloud can quickly scale to thousands of servers to make resources available as they're needed. In comparison, businesses hosting their own web servers can be expensive and troublesome.

Figure 5 shows a concept mapping diagram displaying the benefits of cloud Web hosting. Most of the benefits in Figure 5 have been described in the earlier sub-section. Web servers can be costly and annoying equipment in Internet technology. Though

they are powerful and reliable computers, if conditions are not just right, they are still prone to crash. A downed server on a regular single-server can severely affect the availability of the website, or greatly slow down the data transfer of the website. This often happens when a sudden surge of Internet traffic is directed to a specific website. The request overloading can simply shot down the website in web server. Such a man-made vicious attack trying to overwhelm or shut down a website is also known as the Distributed Denial-of-Service (DDoS) Attack [37]. A DDoS attack can deny a victim (web host, router, or entire network) providing or receiving normal services in the Internet. However, if a server shuts down in a cloud hosting network, other servers will transfer and share the traffic and keep the website running during the traffic overload. Cloud web hosting thus reduces the downtime of web service.

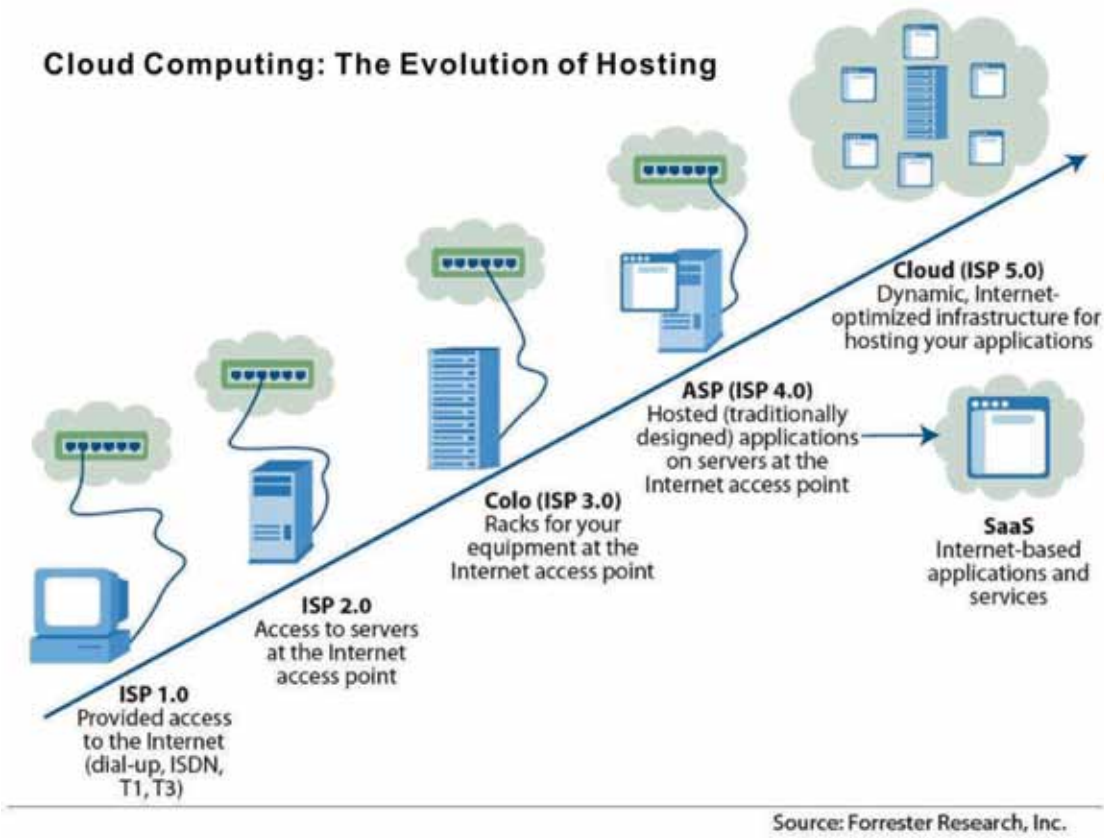

Figure 4. The evolution of web hosting moving toward cloud computing. (Source: Forrester Research, Inc.)

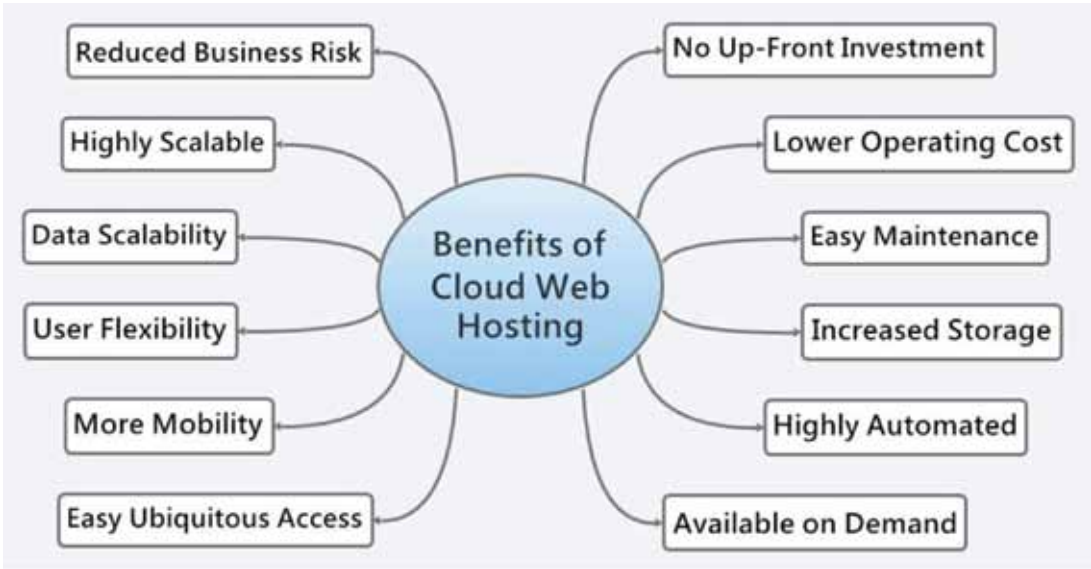

Figure 5. A diagram showing the benefits of cloud web hosting.

Cloud Hosting Multimedia Website for ESL Learning.

Multimedia Website to Facilitate ESL Learning

Electronic and Internet technologies are used to enhance participants' interaction in distance education. Interaction serves a variety of functions in educational transaction, and it acts as an aid to meaningful learning. The value of another person's opinion or guidance can be obtained through interaction. However, interaction comes with a price in distance education. Figure 6 shows the relationship between interaction level and independence of time-distance in terms of different types of educational media **[38]**. We have added the data point of "streaming multimedia" to Figure 6. It is seen in Figure 6 that face-to-face learning has the highest level of interaction but the least level of independence of time-distance. On the other hand, correspondence has the least level of interaction but the highest level of independence of time-distance. The best scenario in Figure 6 would be the computer conferencing. Interaction has always been valued in distance education. Interaction also induces the mindfulness of the learner. However, unlike other types of learning, language learning needs a great deal of self practice.

Guided practice may be preferred or desirable in learning a language, but it is costly and inconvenient. Most practices can be guided with audio-video materials. In cases of ESL learning, a comprehensively designed video can be suitable for self-directed learning and practice. Close captioned videos can be used to enhance the reading and understanding. Therefore, the ubiquitous Internet connection and streaming multimedia videos are good synergetic combination for learning purposes.

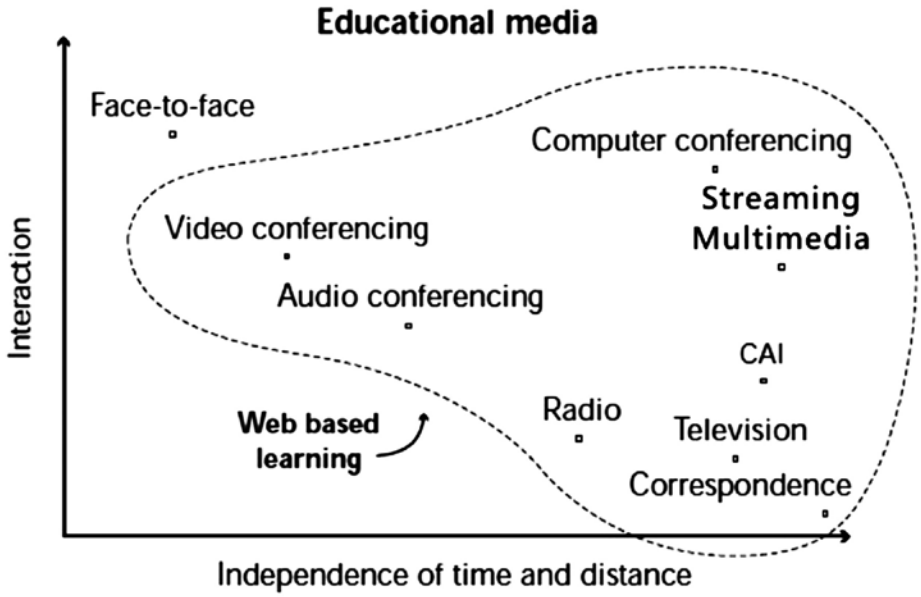

Figure 6. A diagram to show attributes of educational media of various learning methods.

In the era of Web 2.0, the increased use of web video has caused great interest in the use of video for educational purposes. Online streaming videos or “streaming media” are very attractive features for news, teaching, and recreational applications. “Video streaming” can be defined as video which can be played by means of an Internet data stream, directly on a website, in real time, without having to download previously can be played. It can be simply described as "click and get" videos. The media that can be streamed also include still pictures and audios. Streaming media has become a useful self-learning educational tool with many future possibilities **[39, 40]**. Streaming video technology allows viewing in multiple suits, such as iPods, smartphones, iPad

tablet devices, beyond the computer. Easy accessibility, rich database, multimedia capabilities, and interactive functions make the Web an attractive environment for carrying on online ESL learning. This paper is focused on creating a multimedia-rich, effective ESL learning environment based on cloud web hosting.

Figure 7 shows an installed cloud hosting webpage having some embedded YouTube videos. The website address is http://yudaae.weebly.com/. Figure 8 shows another webpage displaying the page navigation scheme in which several webpages are grouped under each subject category. The web hosting company used was Weebly. First released in June 2006, Weebly provides a widget-based website creator. Widget is an element of a graphical user interface (GUI) that displays an information arrangement changeable by the user such as a text box, an image, or a video. This widget-style format allows user to create webpages with an intuitive and user-friendly approach, with only a few clicks and by dragging and dropping different page elements such as images, text, video, or interactive content, onto a page and filling in the content. Weebly competes with Yola, Lifeyo, Cif2.net, Jimdo, Webs, uCoz, Wix, and other web hosting and creation sites **[41].**

Figure 7. An example of installed cloud hosting webpage having YouTube videos.

Figure 8. A cloud hosting webpage showing page navigation and YouTube videos.

Figure 9 shows the frontage of cloud hosting website with editing widget tools on top of the page. Weebly's WYSIWYG editing interface allows users to easily editing content of the currently open Web page. Consistent with this design are also blog web-pages and editor. Figure 10 shows the cloud website showing “Weebly Editor” to manage pages. The page sequence in the navigation can be adjusted by “drag and drop”. This is a very user-friendly feature of editing the page sequence. When the editing is done, publishing the website on the Internet is only a click away. All website data is saved on the cloud host, which is similar to the operation of e-mail accounts. Figure 11 shows a webpage having YouTube movies with closed caption. The streaming speed of YouTube videos in the webpage is usually very fast. If the Web connection is broadband, many videos can be played at the same time and started almost instantly.

Figure 9. An editor's view of the cloud hosting webpage having widget tools.

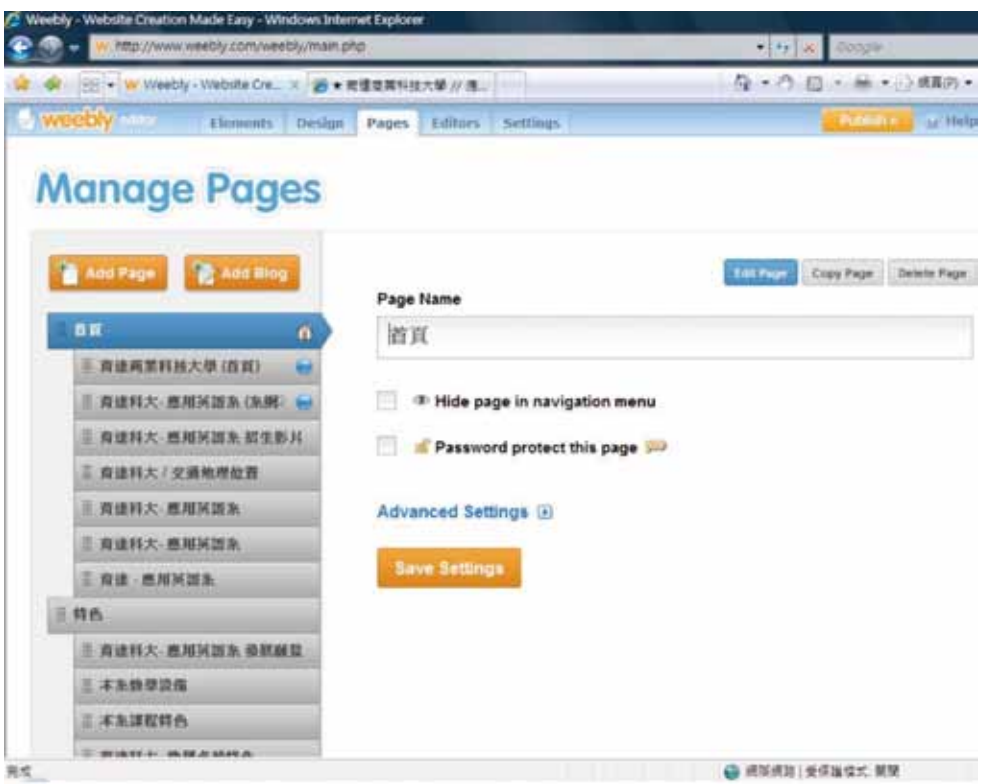

Figure 10. The cloud website showing the Weebly Editor for managing webpages.

Figure 11. A webpage having YouTube movies with closed caption.

Performance of YouTube Video Streams

Watching online video has become very popular as more people have broadband Internet connection. YouTube is a popular video-on-demand service that allows users to stream user-generated video content through the Internet. Established in 2005, YouTube is one of the fastest-growing websites, and has become one of the most accessed sites in the Internet. According to the Alexa's top 500 traffic ranking **[42]**, YouTube is currently the third most popular website on the Internet, only after Google.com and Facebook. YouTube has been noted in literature as being one of the primary causes behind the recent increases in HTTP traffic observed in measurement studies **[43]**. As of May 30, 2011, near its sixth anniversary, YouTube videos daily watching exceeded 3 billion times. YouTube's viewers are from around the world.

Most of the networks offer video streaming services for some of their content. But, not all video streaming services perform the same. Figure 12 shows a comparison

of online video streaming performance of some popular providers **[44]**. The performance is a key factor in watching video. High performance means that the users can continue to use their computer while watching a video. The performance is measured at how much computer's CPU usage (%) it took to download while playing the video. The data in Figure 12 are average percentage, as CPU usage can vary throughout the video playback. Thus, smaller CPU usage (%) means better streaming performance. The test in Figure 12 was performed on a 2011 MacBook Air computer with a 1.8GHz i7 processor. The i7 processor is a dual-core chip, which is capable of 200 percent CPU usage. The performance of using "Adobe Flash" varies widely from service to service. It is shown that YouTube and Dailymotion have the most efficient Flash player at 25 percent CPU usage. The worst performing Flash players use around 60 percent and come from Vimeo, ESPN, and NBC. It was surprising to see Vimeo so high, as they are also a video sharing service, like YouTube. The worst performer in this test is Netflix, the largest video streamer on the Internet. It uses 75 percent of the CPU in the MacBook Air for a standard video.

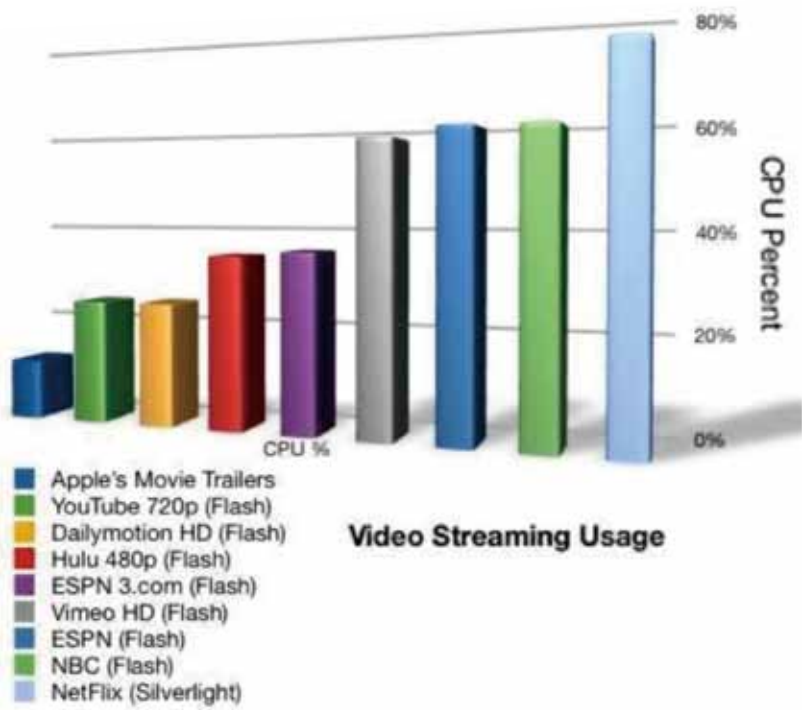

Figure 12. A comparison of online video streaming performance of various providers [44].

Conclusion

Competence in a second language (L2) such as English is often as important as other basic skills in life. The Internet has proved to be a powerful tool for learning purposes. In the last two decades, computer and Internet technology have established a powerful presence in English learning. The common justification for the use of computers in language learning is that it promotes self-directed learning and the language learning depends heavily on self practice. In recent years, information technology has advanced to even more efficient operation of cloud computing, broadband connection, and ubiquitous mobile Internet. Meanwhile, the popular Web 2.0 YouTube service has collaboratively created a wealth of English learning videos and these videos can be freely utilized as embedded videos in online websites. The integration of modern Internet technology, cloud computing, Web 2.0 media, and self-directed learning of English becomes an attractive combination. The contribution of this paper is to have combined these desirable features and made them into a useable application for learning. This paper has presented a demonstration of using cloud-hosting multimedia website to facilitate autonomous ESL learning. The website contains a large amount of embedded YouTube videos that exhibit rapid streaming speed. Advantages of cloud computing, cloud hosting, and Web 2.0 media are synergetically utilized for learning. The website is also suitable and convenient for ESL classroom teaching. Having rich content and user-friendly multimedia features, we justifiably believe that this website is very suitable for motivated autonomous ESL learners.

References

[1] Cappel, J. J., & Hayen, R. L. (2004). Evaluating e-learning: A case study. *Journal of Computer Information Systems,* 44(4), 49-57.

[2] Liu, S.-H., Liao, H.-L. and Pratt, J.A. (2009) Impact of media richness and flow on e-learning technology acceptance. *Computers & Education,* **52**, 599–607.

[3] Brown, Aldrin (2006). Learning from a distance. *Journal of Property Management,* 71(4), 42–45.

[4] Mackay, S. and Stockport, J. (2006). Blended learning, classroom and e-learning. *The Business Review,* 5(1), 82-88.

[5] Kuschnig, R., Kofler, I. and Hellwagner, H. (2010) Improving Internet Video Streaming Performance by Parallel TCP-based Request-Response Streams, *Consumer Communications and Networking Conference* (CCNC), January 9-12, 2010, 1-5.

[6] Zhang, J. (2010) On the issues of web-based college English autonomous learning in China, *2010 International Conference on Artificial Intelligence and Education (ICAIE)*, 29-30 Oct. 2010, 749-752.

[7] Bliuc, A.M., Goodyear, P. and Ellis, R.A. (2007) Research focus and methodological choices in studies into students' experiences of blended learning in higher education, *Internet and Higher Education.* 10 (2007) 231–244.

[8] O'Reilly, Tim (2005). What Is Web 2.0, Design Patterns and Business Models for the Next Generation of Software, 09/30/2005. http://oreilly.com/web2/archive/what-is-web-20.html

[9] Cha, M. et al. (2007) "I Tube, You Tube, Everybody Tubes: Analyzing the World's Largest User Generated Content Video System," in IMC '07: Proc. of the 7th *ACM SIGCOMM conference on Internet measurement.* New York: 2007, 1–14.

[10] Voas, J., & Zhang, J. (2009). "Cloud computing: New wine or just a new bottle?" *IT Professional,* 11(2), 15–17.

[11] Grossman, R. (2009). The case for cloud computing. *IT Professional,* 11(2), 23–27.

[12] Zhang, Q., Cheng, L. and Boutaba R. (2010) Cloud computing: State-of-the-art and research challenges, *Journal of Internet Services & Applications*, 2010. 1:7-18.

[13] Noels, K., Pettetier, L. and Vallerand, R. (2000) Why are you learning a second language? Motivational orientations and self-determination theory, *Learning Language,* 50:1, Feb. 2000, 57-85.

[14] Gardner, R.C. and Clement R. (1990) Social psychological perspectives on second language acquisition. *Handbook of social psychology* (pp.495-517). Chichester, UK: John Wiley & Sons.

[15] Gardner, R.C. (1985) *Social psychology and second language learning.* London: Arnold.

[16] Dornyei, Z. (2001) *Motivational Strategies in the Language Classroom.* Cambridge University Press.

[17] Schmidt, R., Boraie, D. and Kassabgy, O. (1996) Foreign language motivation: Internal structure and external connections. *Language learning motivation: Pathway to the new century* (pp.14-87).University of Honolulu Press.

[18] Holec, H. (1981) *Autonomy and foreign language learning.* Oxford: Pergamon Press. (First published 1979,

Strasbourg: Council of Europe.)

[19] Hurd, S., Beaven, T. and Ortega, A. (2001). Developing autonomy in a distance language learning context: Issues and dilemmas for course writers. *System,* 29(3), 341–355.

[20] Cotterall, S. (1995) Developing a course strategy for learner autonomy. *ELT Journal* 49/3: 219-27.

[21] Candy, P.C. (1991). Self-direction for lifelong learning. *A comprehensive guide to theory and practice.* San Francisco: Jossey-Bass.

[22] McDonald, J. B. (1967). Independent learning: The theme of the conference. In G. Gleason (Ed.). *Theory and nature of independent learning: A symposium.* Scranton, PA: International Textbook Co.

[23] Knowles, M. S. (1962). *The adult education movement in the United States.* NY: Holt, Rinehart, and Winston, Inc.

[24] Knowles, M. S. (1968) Andragogy, Not Pedagogy. *Adult Leadership,* 16(10), 350–352, 386.

[25] Knowles, M. S. (1970) *The modern practice of adult education: Andragogy versus pedagogy.* NY: Association Press.

[26] Davenport, J., and Davenport, J. (1985) A Chronology and Analysis of the Andragogy Debate. *Adult Education Quarterly,* 1985, 35(3), 152–159.

[27] Henschke, J.A. (2008) Comparing the American and European Perspectives on the International Concept of Andragogy and the Implications for the Development of Adult Education Theory and Practice, In *Proceedings of the Adult Education Research Conference,* St. Louis, MO, June, 2008.

[28] Knowles, M.S. (1975) *Self-directed learning: a guide for learners and teachers.* New York, NY: Cambridge Books.

[29] Knowles, M. (1980). *The modern practice of adult education: From pedagogy to andragogy.* (2nd ed.) New York: Cambridge Books.

[30] Garrison, D.R. (1997). Self-directed learning. Toward a comprehensive model. *Adult Education Quarterly*, 48(1), 18-33.

[31] Brookfield, S.D. (2009) Self-directed learning. *International Handbook of Education for the Changing World of Work,* Chapter XV.7, 2615-2627, Springer.

[32] Zhou, M. et al. (2010) "Services in the cloud computing era: A survey," In *the Proceedings of the 2010 4th International Universal Communication Symposium (IUCS2010),* October 18-19, 2010, Beijing, China, 40-46,

[33] Alabbadi, M. (2011) Cloud Computing for Education and Learning: Education and Learning as a Service (ELaaS), *2011 International Conference on Interactive Collaborative Learning,* 589-594.

[34] Vaueo, L. et al. (2009) A break in the clouds: Towards a cloud definition, *ACM SIGCOMM, Computer Communication Review,* 2009, 50-55.

[35] Grossman, R. (2009). The case for cloud computing. *IT Professional,* 11(2), 23–27.

[36] Baun, C. et al. (2011) Selected cloud offering, *Cloud Computing,* Chapter 4, 2011, 23-38. Springer-Verlag.

[37] Chang, R.K.C. (2002) Defending against Flooding-Based Distributed Denial-of-Service Attacks: A Tutorial, *IEEE Communications Magazine,* October 2002, 42-51.

[38] Anderson, Terry (2004) *Toward a Theory of Online Learning, in Theory and Practice of Online Learning.*

Chapter 2, 33-60, 2004.

[39] Shephard, K. (2003). Questioning, promoting and evaluating the use of streaming video to support student learning. *British Journal of Educational Technology,* 34, 3, 295–308.

[40] Koumi, J. (2006). *Designing educational video and multimedia for open and distance learning.* The Open and Flexible Learning Series. London: Taylor & Francis.

[41] What is Cloud Web Hosting and Will it Work for Me? *Hub webhostinghub.com,* http://www.webhostinghub.com/web-hosting-guide/what-is-cloud-web-hosting-and-will-it-work-for-me/, Retrieved on June 2, 2012.

[42] Alexa, "Top 500 Global Sites," http://www.alexa.com/topsites, Retrieved on June 2, 2012.

[43] Maier, G. et al. (2009) On Dominant Characteristics of Residential Broadband Internet Traffic, in *9th ACM SIGCOMM Conference on Internet Measurement Conference.* New York, ACM, 2009, 90–102.

[44] Video Streaming Performance Comparison, Apple News, Analysis and Podcasts, Novenber 2, 2011. http://t-gaap.com/2011/11/2/video-streaming-performance-comparison