Computer Fraud and Security
ISSN (online): 1873-7056

Construction of English Teaching Model Based on Cloud Service Information Security Platform

Yanhua Hao
School of Foreign Languages, Henan Financial University; Zhengzhou ,Henan, China

Abstract:

In order to improve the effect of cross-cultural teaching for international students, this paper combines the cloud service platform to conduct research on cross-cultural teaching of international students. Based on the time-triggered sampling mechanism, the sampling interval is shortened and the sampling frequency is increased, thereby increasing the synchronization of the entire system. Moreover, aiming at the assumption of complex overlapping asynchronous time periods, a mathematical model for switching under complex asynchronous conditions in this paper is given, and then the mathematical model of the filter based on the event-triggered sampling mechanism is given, and the filtering error system is obtained.The research shows that the cross-cultural teaching system for international students based on the cloud service platform can effectively improve the efficiency of cross-cultural teaching.

Keywords: cloud service platform; international students; cross-cultural; teaching; Information Security

1 INTRODUCTION

Internationalized higher education closely links the economy, culture, information and knowledge of various countries in the world, and the sharing of cutting-edge information has become a distinctive feature of this civilization.The internationalization of foreign language education in universities is produced under the background and drive of the globalization of the world economy, and one of the manifestations of the internationalization of higher education is cross-cultural communication. The teaching goal of college English is to cultivate students' comprehensive English application ability, enhance their independent learning ability, and adapt to our social development and international cultural exchange. However, in real classroom teaching, teachers often only pay attention to the basic knowledge and the explanation of grammatical structure, but ignore the real cultural connotation behind the target language, and ignore the practical application ability of English and the cultivation of cross-cultural communication ability.At the same time, it also deviated from the track of cultivating talents with cross-cultural communication skills in line with international standards. Therefore, we not only need to cultivate students' language use ability, but also cultivate students' cross-cultural communication ability, to be able to effectively use English as a language, and at the same time to improve their cultural literacy, so as to play their role in the international arena.

The process of intercultural communication is a step-by-step process and a process of adapting to another culture [1]. In the course of teaching, teachers have the responsibility to consciously add cultural input in real time while explaining the knowledge of the target language according to the characteristics of the students, so as to improve the students' ability to distinguish the differences between the local culture and the target language culture, and to truly learn in the culture. To the language itself, learn to use the language authentically in the appropriate culture, and at the same time improve the students' awareness of cross-cultural communication [2]. Cultivating Students' Intercultural Communication Ability To cultivate students' intercultural communication ability, we need to permeate all aspects of teaching. In the course of reading the text, teachers can explore the cultural content in the background knowledge of the text, and show it to students through multimedia, music, film and television, etc., to inspire students to understand cultural knowledge, and to compare with local culture, identify similarities and differences, and deepen students' understanding The understanding of cross-cultural differences can improve students' autonomous learning ability and autonomous expression ability [3]. In the listening and speaking class, teachers try their best to create real communication situations for students, and let students participate in it through role-playing and other methods, imitate various interpersonal communication behaviors, and experience cultural differences, thereby cultivating and improving students' cross-cultural communication. ability [4]. At the same time, some original English phone numbers can be shown to students, and students can take class notes or memoirs, experience the use of some informal languages in specific scenarios, and guide students to understand the expressions, lifestyles and communication methods of people in the target language countries. . In this way, students can learn culture in a relaxed and pleasant environment, understand the connotation of culture, and cultivate cross-cultural communication skills [5].

Literature [6] believes that intercultural communicative competence specifically refers to the knowledge, motivation and skills needed to properly and effectively communicate with people from different cultural backgrounds. Literature [7] believes that intercultural communicative competence refers to the skills of communicators to conduct reasonable and appropriate verbal and non-verbal interactions in the context of cultural differences and to eliminate subsequent psychological burdens and communicative consequences. In recent years, the international landscape has undergone major changes. Some developing countries play an important role in international affairs. In many cases, both sides of the communication are non-English speakers. Scholars have also begun to pay attention to cross-cultural communication in the context of English as an international lingua franca. Compared with native English speakers, non-native English speakers have always been a subgroup. For a long time, many people believed that only native English speakers were the "rules of the game". Literature [8] pointed out that in the current internationalization of talents, the standard of native English speakers cannot become the only standard of communication for non-native English speakers. Non-native English speakers use English for work and life, fostering relationships, and expressing their identity. Compared with precise language, they are more concerned about whether their communicative tasks can be successfully completed. Literature [9] pointed out that the culture of English-speaking countries should be taken as the general cultural teaching goal in English teaching. Literature [10] believes that college English teaching should emphasize the concept of cultural introduction. In addition to learning the language of the target language, it is also necessary to master the cultural traditions of the target language country and eliminate the interference of the mother tongue culture. Literature [11] emphasizes that guiding students to accurately express "local culture" in foreign language teaching is conducive to the spread of Chinese culture to the world. Some scholars attach great importance to the empirical research on the test of intercultural communicative competence. However, the subjects of these studies are usually undergraduates or English majors, and rarely involve students of general majors in higher vocational colleges. It is also rare to discuss the changes in the connotation of intercultural communicative competence under the background of international talents and its enlightenment to foreign language teaching. This paper will do some tentative research in these aspects [12].

Linguistic accuracy is no longer the most important factor in cross-cultural communication, but in teaching, we should not deviate too much from the language core of native English, because this is the basis for non-native English speakers to communicate. On this basis, it is appropriate to allow students to make mistakes in language expression, as long as the English expressed by the students can be understood and accepted by the communicator [13]. Gradually infiltrate non-native language variants in higher-level language learning, such as the characteristics of English language variants in Japan and India, so that students can adapt to and understand non-English native languages in addition to pure English. language. When cultivating the cross-cultural competence of vocational students, we should pay attention to professors who carry out cross-cultural projects at different majors and teaching levels [14].

Many researchers believe that it is the learner's pragmatic competence, that is, the ability to act in words, that determines the strength of intercultural communication competence. Pragmatic competence is defined as the ability to properly convey communicative intentions and successfully achieve communicative goals. In addition to integrating the most basic pragmatic principles such as politeness and cooperation into classroom teaching, students should also be guided to pay attention to the context of communication and the communicator. identities, both of which are dynamic and complex [15]. In what context should the target language country culture be followed, and in what context can the national identity be properly highlighted and Chinese culture spread. One factor that must be taken into account, regardless of whether pragmatic principles are followed or violated, is cultural differences. When teaching, it is important to raise awareness of the types of rules that arise in communication, not the number of rules. With this awareness, learners can finally choose appropriate strategies on the spot in the process of communication to cope with changing situations through self-lifelong learning [16].

In order for people from different cultural backgrounds to successfully communicate, cooperate and work together, both parties must first have cross-cultural awareness and global awareness, which is a prerequisite for successful cross-cultural communication [17]. Cross-cultural awareness refers to the comprehension and sensitivity to the similarities and differences between one's own culture and other countries' cultures and the relationship between them. Consciousness of one's own thinking, behavior, speech strategies, etc. [18]. Cross-cultural awareness includes the awareness of cultural differences, that is, the recognition of cultural differences; the awareness of cultural equality, which believes that there is no difference between good and bad cultures; sensitivity to cultural differences; identification and understanding, tolerance and respect for different cultures with a positive and open mind ; Awareness and reflection on one's own cultural values and behavior, and avoid judging the other's behavior by the standards of one's own culture. Global awareness includes having an international vision, awareness of international cooperation and awareness of international rules [19].

This paper combines the cloud service platform to conduct research on cross-cultural teaching for international students, and explores to improve the effect of cross-cultural teaching for international students.

2 TEACHING INFORMATION PROCESSING BASED ON CLOUD SERVICE

2.1Continuous time linear switching system

The basis of this study is based on continuous-time linear switching systems. A continuous-time linear switching system can be described by the following mathematical model:

$$\dot{x}(t) = A_{\sigma(t)}x(t) + B_{\sigma(t)}\omega(t)$$
$$\dot{y}(t) = C_{\sigma(t)}x(t) + D_{\sigma(t)}v(t)$$
$$z(t) = L_{\sigma(t)}x(t) \quad (1)$$

Among them, $x(t) \in R^n$, $y(t) \in R^m$ and $z(t) \in R^p$ represent the system state, the measured output and the signal to be estimated, respectively.$\omega(t) \in R^l$ and $v(t) \in R^q$ represent interfering input and measurement noise, respectively, and their range is $[0, \infty].R^+ \to \tau = \{1,2,\dots,N\{\}\}$ is a piecewise function and satisfies the right-continuous property, N represents the number of subsystems in the entire switching system, and i represents the i-th subsystem.For each $i \in \tau, A_i, B_i, C_i, D_i, L_i$ is a constant matrix.

Definition 1: When considering the following series of switching times $0 < t_1 < t_2 < t_3, \dots, < t_i <\dots$ and $t_0 = 0$, if there is $t_{i+1} - t_i \geq \tau_i$ for subsystem i, then the constant $\tau_i > 0$ is the model-dependent dwell time (MDT) of subsystem i.

Definition 2: For a given switching signal $\sigma(t)$, when the switching system (1) of $\omega(t) = 0$ is globally consistent exponentially stable (GUES), if and only if for any initial condition x(t0), $u > 0, 0 < v < 1, \forall t \geq t_0$ exists such that the system satisfies $\|x(t)\| \leq \mu v^{t-t_0}\|x(t_0)\|$.

2.2 Event-triggered sampling mechanism

This paper assumes that the sampling period is $h > \tau_i$.Meanwhile, in order to generate the transmission sequence $\{t_k\}_{t\geq 0}$ and $t_0 = 0$, this paper proposes an event-triggered sampling mechanism, the transmission sequence is (2) and (3):

$$t_{k+1} = min\{t'_{k+1}, t_k + h\} \quad (2)$$

and

$$t'_{k+1} = \min_{t>t_k}\{t, e_y^T(t)\Phi_{\sigma(t_k)}e_y(t) \geq y^T(t_k)\psi_{\sigma(t_k)}y(t_k)\} \quad (3)$$

Among them, $e_y(t) = y(t) - y(t_k)$ represents the sampling error at the new sampling time $t > t_k$.The positive definite matrix $\Phi_{\sigma(t_k)}$ and the positive number $\psi_{\sigma(t_k)}$ are the event-triggered coefficients of the respective subsystems in the event-triggered switching system.To simplify the analysis, we call $t_k, t_{k+1})$ a retention time under the event-triggered sampling mechanisms (2) and (3). Obviously, for this time $t_k, t_{k+1})$, we have:

$$e_y^T(t)\Phi_{\sigma(t_k)}e_y(t) < y^T(t_k)\psi_{\sigma(t_k)}y(t_k) \quad (4)$$

It is not difficult to find from formulas (2) and (3) that the system discriminates and samples according to the preset sampling interval h and sampling trigger conditions. t_k is the sampling point at time k, and t_{K+1} is the sampling point at time k+1, that is, the next moment at time k. Then, the sampling trigger condition at the next moment at time k is either the sampling interval h or formula (3), and the minimum value of the two is taken as the sampling point at the next moment.

Considering the problem of network resource consumption, in order to reduce unnecessary information transfer to save network resources and increase the efficiency of network transfer, this paper uses event-triggered sampling mechanism instead of time-triggered sampling mechanism to reduce unnecessary sampling points. Under the event-triggered sampling mechanism, sampling is only triggered when a specific event is met. According to the above event-triggered sampling mechanism, the sampling will only be triggered when the error of the system satisfies the formula (3). Obviously, the sampling under this mechanism can reduce many unnecessary sampling points compared with the sampling under the time-triggered sampling mechanism, thus greatly reducing the unnecessary waste of network resources.

At the same time, this paper proposes a hypothesis: multiple switching is allowed between two sampling points. Therefore, when establishing the mathematical model, this paper will consider reducing the sampling points and increasing the switching times of the system. The above-mentioned event-triggered sampling mechanism is more advantageous under this assumption.

In the research of the switching system of the time-triggered sampling mechanism, it is generally assumed that there is a time period $t_k, t_{k+1})$ to constrain the dwell time, namely $t_{k+1} - t_k < \tau_i$ .Under this assumption, there is at most one switch in two adjacent sampling intervals $t_k, t_{k+1})$. Or equivalently, in a switching period o(t), the output of the system is sampled by the filter at least once. Obviously, the stability analysis of the event-triggered switching system based on the above assumptions will be much simpler.

However, in the actual engineering system, the switching of sampling and system is not so simple. When switching becomes frequent and the system cannot sample quickly, there will be multiple switching between two sampling intervals, which is the focus of this paper. In the study of this paper, the sampling period h can be larger than the model-dependent dwell time, that is, h > t, so there will be multiple switching occurrences in two adjacent sampling intervals. Based on the above considerations, frequent switching will cause complex asynchronous situations. The following will analyze and study the complex asynchronous situations.

2.3Asynchronous situation analysis

Most of the literature on the research and analysis of H_∞-filters assumes only synchronization and imposes time constraints on asynchrony.Considering only the synchronization case is much simpler in theoretical analysis, since in this case the filter is always matched in real time to the system state of the switched system. However, in practical engineering, there is almost no situation in which the filter and the system state are kept synchronous all the time, that is, there will always be a time period that is asynchronous.

For various complex asynchronous situations that may appear, this chapter lists and analyzes them. This paper divides complex asynchronous situations into the following three types: non-overlapping asynchronous time intervals, partially overlapping asynchronous time intervals, and fully overlapping asynchronous time intervals. The partially overlapping asynchronous time intervals are divided into two types, as shown in Figures 1 and 2.The following will analyze the above three complex asynchronous situations one by one. Among them, M_1 and M_2 represent two states of the system, synchronous and asynchronous states, respectively. t, t+1, and t+2 represent the switching of the switching system at the i, i+1, and i+2 times, respectively, and d_i and d_{i+1} respectively correspond to the mismatched time periods of subsystem i and subsystem i+1.

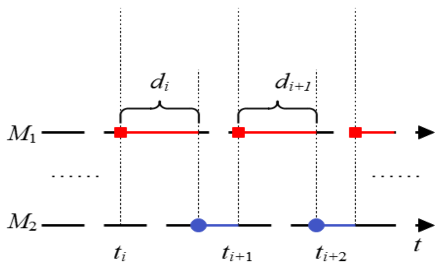

Figure 1 Schematic diagram of a non-overlapping asynchronous time interval switching system

Non-overlapping asynchronous intervals are the simplest of the asynchronous cases. The non-overlapping asynchronous time interval ensures that the switching system and filter can maintain a consistent state until the next system switching. In other words, in a switching time interval, there must be one sampling, so that the state of the entire system can be kept synchronized before the next switching.

In order to ensure the synchronization state in each switching time interval, this situation has higher requirements on sampling, that is, it is ensured that there is a sampling point in the active period of each switching subsystem. In general analysis, most of the asynchronous events are limited to be less than the model-dependent residence time of the currently active switching subsystem. Therefore, the difficulty of analysis and research is low, and many existing stability analysis and controller design of switching systems under event-triggered sampling mechanism are based on this situation. This situation is also a relatively ideal situation.

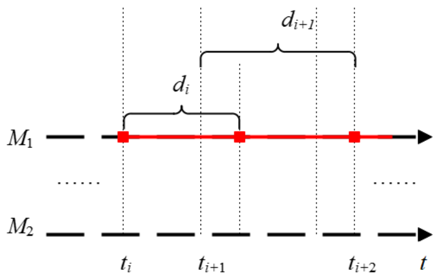

Figure 2 Schematic diagram 1 of a partially overlapping asynchronous time interval switching system

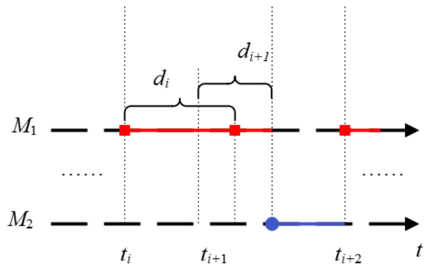

Figure 3 Schematic diagram 2 of a partially overlapping asynchronous time interval switching system

Figures 3 and 4 are a combination of Figures 1 and 2 . Different from Figure 2, in Figure3, the switching subsystem of $t_s, t_{s+1})$ can always be sampled no later than $t_{s+1}, t_{s+2})$ to reach the synchronous state.

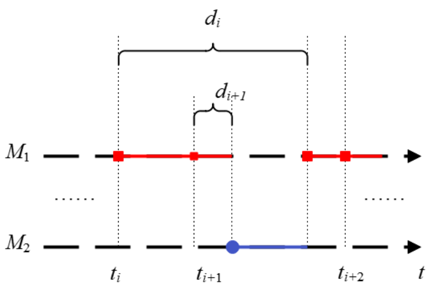

Figure 4 Schematic diagram of a fully overlapping asynchronous time interval switching system

Figure 4 shows that the previous asynchronous interval period is longer than the immediately next asynchronous interval period, and the following asynchronous interval period is completely covered by the previous asynchronous interval period, forming a fully overlapping asynchronous interval. Fully overlapping asynchronous intervals are the most complex of several overlapping asynchronous intervals.

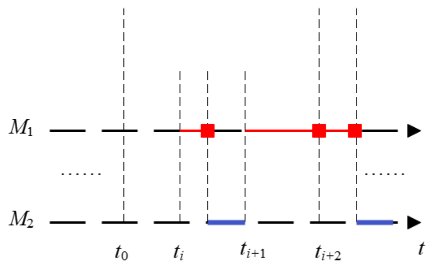

Figure 5 Schematic diagram of the overlapping asynchronous time interval switching system studied in this paper

Figure 5 is the asynchronous situation studied in this paper. In this case, multiple asynchronous situations can occur simultaneously. The simple asynchronous case is the non-overlapping asynchronous time interval shown in Figure 1. At the same time, the assumptions of this paper allow for complex asynchronous situations, that is, there can be overlapping asynchronous time intervals. Combining the above two asynchronous cases, the hypothesis in this paper can be described as the case shown in Figure 5. Therefore, the asynchronous time interval can be much larger than the model-dependent dwell time, and there can be multiple switching between two adjacent samples. Correspondingly, the asynchronous time interval is also allowed to overlap.

2.4H_∞-filter based on event-triggered sampling mechanism

In order to abstract the above assumptions into a mathematical model for further analysis, this paper assumes that there is another switch in the time period $t_i, t_{i+1})$, and the corresponding switch moment is denoted as $t_i + T_0$. We split $t_i, t_{i+1})$ into two parts: $t_i, t_i + T_\sigma)$ and $t_i + T_{\sigma,} t_{i+1})$, thus:

$$\delta(t) = \begin{cases} 0, t \in t_i, t_i + T_\sigma) \\ 1, t \in t_i + T_{\sigma,} t_{i+1}) \end{cases} \tag{5}$$

Formula (5) divides the time period $t_i, t_{i+1})$ into two parts, thereby describing the hypothesis of overlapping asynchronous time periods.By analyzing the switching time t+T and the sampling time tx, and discussing the sequence of the two, two asynchronous situations can be obtained respectively.When the sampling time t occurs before the switching time t+T, there is a synchronized period of time before the switching time t+T.If the sampling time t occurs after the switching time ti+T, the event-triggered switching system and the $\boldsymbol{H}_\infty$-filter are always in an asynchronous state during the period of [t,t+T,).Therefore, the above formula (2-5) can be used to analyze the hypothesis of asynchronous overlapping period proposed in this paper.

The system output of the filter model is $y(t_k)$ and the state is $\sigma(t_k)$. The switched filter system can be described as the following mathematical model:

$$\begin{aligned} \dot{x}_f(t) &= A_{f\sigma(t),\delta(t)} x_f(t) + B_{f\sigma(t),\delta(t)} y(t_k) \\ z_f(t) &= C_{f\sigma(t),\delta(t)} x_f(t) + D_{f\sigma(t),\delta(t)} y(t_k) \end{aligned} \tag{6}$$

Amongthem, $x_f(t)$ is the filter state. $A_{f\sigma(t),\delta(t)}$, $B_{f\sigma(t),\delta(t)}$, $C_{f\sigma(t),\delta(t)}$, and $D_{f\sigma(t),\delta(t)}$ are the filter coefficients to be calculated, and $\sigma(t) \in \tau$ is the switching signal based on the event-triggered sampling mechanism.

In a practical system, the asynchronous situation will inevitably lead to a period of time to detect the current system state and match the corresponding filter. In order to design a filter model that is closer to the actual situation, this paper assumes a filter error function $e(t) = z(t) - z_f(t), \xi(t) = [x^T(t) \quad x_f^T(t)]^T, \omega(t) = [x^T(t) \quad v^T(t)]^T$. We notice $e(t) = y(t) - y(t_k)$ and we get the filter error system of (7) to (9):

$$\begin{cases} \dot{\xi}(t) = \tilde{A}_{\sigma(t_i),\sigma(t_i),\delta(t)} \xi(t) + \tilde{B}_{\sigma(t_i),\sigma(t_i),\delta(t)} e_y(t) + \tilde{B}_{\sigma(t_i),\sigma(t_i),\delta(t)} \widetilde{\omega}(t) \\ e(t) = \tilde{C}_{\sigma(t_i),\sigma(t_i),\delta(t)} \xi(t) + D_{f\sigma(t_i),\delta(t)} e_y(t) + \widetilde{D}_{\omega\sigma(t_i),\sigma(t_i),\delta(t)} \widetilde{\omega}(t) \end{cases} t \in \breve{T}_s \tag{7}$$

$$\begin{cases}\dot{\xi}(t) = \tilde{A}_{\sigma(t_{i+2}),\sigma(t_i),1}\xi(t) + \tilde{B}_{\sigma(t_{i+2}),\sigma(t_i),1}e_y(t) + \tilde{B}_{\omega\sigma(t_{i+2}),\sigma(t_i),1}\widetilde{\omega}(t) \\ e(t) = \tilde{C}_{\sigma(t_{i+2}),\sigma(t_i),1}\xi(t) + D_{f\sigma(t_i),1}e_y(t) + \widetilde{D}_{\omega\sigma(t_{i+2}),\sigma(t_i),1}\widetilde{\omega}(t)\end{cases} t \in \hat{T}_s \tag{8}$$

$$\begin{cases}\dot{\xi}(t) = \tilde{A}_{\sigma(t_{i+1}),\sigma(t_i),1}\xi(t) + \tilde{B}_{\sigma(t_{i+1}),\sigma(t_i),1}e_y(t) + \tilde{B}_{\omega\sigma(t_{i+1}),\sigma(t_i),1}\widetilde{\omega}(t) \\ e(t) = \tilde{C}_{\sigma(t_{i+1}),\sigma(t_i),1}\xi(t) + D_{f\sigma(t_i),1}e_y(t) + \widetilde{D}_{\omega\sigma(t_{i+1}),\sigma(t_i),1}\widetilde{\omega}(t)\end{cases} t \in T_{as} \tag{9}$$

Among them, $\breve{T}_s$, $\hat{T}_s$ and T_{as} represent the time period of two synchronous cases and the time period of one asynchronous case, respectively.

During the $\breve{T}_s$ time period, both the subsystem and the H_∞-filter operate in the i state, which is the synchronization case.During the $\hat{T}_s$ time period, the subsystem may first run in another state (not state i), and then change to state i, while the H_∞ filter always remains in state i.In this case, the H_∞-filter will again be matched to the subsystem in the (i+2) state.During the T_{as}period, both the H_∞-filter and the subsystem are in different states.For example, the subsystem is in the (i+1) state, and the H_∞-filter is in the state i. In this case, the H_∞-filter cannot match the subsystem.

Through the idea of overall analysis, the complex asynchronous situation is transformed into two synchronous situations and one asynchronous situation, so it is no longer necessary to limit the asynchronous time, which is largely close to the fact that the asynchronous time is unknown in actual engineering.

The coefficients in the filter error system are given by the following matrix:

$$\begin{aligned}
\tilde{A}_{\sigma(t_i),\sigma(t_i),\delta(t)} &= \begin{bmatrix} A_{\sigma(t)} & 0 \\ \tilde{B}_{f\sigma(t),\delta(t)}C_{\sigma(t)} & A_{f\sigma(t),\delta(t)} \end{bmatrix} \\
\tilde{B}_{\sigma(t),\sigma(t),\delta(t)} &= \begin{bmatrix} 0 \\ -B_{f\sigma(t),\delta(t)} \end{bmatrix} \\
\tilde{B}_{\omega\sigma(t),\sigma(t),\delta(t)} &= \begin{bmatrix} B_{\sigma(t)} & 0 \\ 0 & B_{f\sigma(t),\delta(t)}D_{\sigma(t)} \end{bmatrix} \\
\tilde{C}\sigma(t),\sigma(t),\delta(t) &= \begin{bmatrix} L_{\sigma(t)} - D_{f\sigma(t),\delta(t)}C_{\sigma(t)} - C_{f\sigma(t),\delta(t)} \end{bmatrix} \\
\widetilde{D}_{\omega\sigma(t),\sigma(t),\delta(t)} &= \begin{bmatrix} 0 & -D_{f\sigma(t),\delta(t)}D_{\sigma(t)} \end{bmatrix}
\end{aligned} \tag{10}$$

Moreover, inequality (4) will result in the following constraints:

$$e_y^T(t)\Phi_{\sigma(t_k)}e_y(t) < y^T(t_k)\psi_{\sigma(t_k)}\left(y(t_k) - e_y(t)\right), t \in t_k, t_{k+1}) \tag{11}$$

The above is the model of the filtering error system in this paper, and the subsequent analysis is based on the above system model. It is not difficult to find that the filter error system model proposed in this paper is more complicated than the filter error system model in the existing literatures, which is also the filter error system model constructed due to the assumption of complex asynchronous and overlapping time periods.

Under the event-triggered sampling mechanism, different from the filter form given in the literature, the filter form given in this paper is affected by complex asynchronous conditions, so its coefficient matrix will also have different representations according to different asynchronous conditions. The filter form given in this paper is:

$$\begin{aligned}\dot{x}_f(t) &= A_{fp}x_f(t) + B_{fp}y(t_k) \\ z_f(t) &= E_{fp}x_f(t)\end{aligned} \tag{12}$$

Compared with the filter form (6) given in this paper, the complex asynchronous case is not considered in the literature.It can be seen from equation (6) that the H_∞-filter coefficients are affected by two signals $\sigma(t)$ and $\delta(t)$.Among them, $\sigma(t)$ is related to the sampled signal, and $\delta(t)$ is generated by the switching signal of formula (5).By analyzing the sequence of the sampled signal in the current switching and a simulated switching signal, the overlapping asynchronous time period under the assumption of this paper can be simulated. Therefore, very different from the H-filter model in the literature, the filter in this paper is affected by two signals simultaneously, which are used to characterize the synchronous and asynchronous states of the H_∞-filter and event-triggered switching system.So the asynchronous situation in this paper is more complicated. The filter model in the literature is only affected by the sampling signal in a switching cycle, so the filter model in this paper is more complicated, and the difficulty of research is also greatly increased.

Based on the above analysis, when selecting the same switching system model, considering different filter models, the obtained filter error systems are also very different.Because the sampling signal $\sigma(t)$ and the analog switching signal $\delta(t)$ are considered, the filtering error systems (7) to (9) in this paper are also much more complex than the filtering error systems in the literature when considering the complex asynchronous situation.

The L_2 gain of the system is analyzed, and the following theorems are used:

Theorem 3 For given coefficients ∈ and γ, the filter error system is GUES and has a weighted performance index (∈,y) when

(1) The filter error system is exponentially asymptotically stable;

(2) Under the zero initial condition, for any non-zero $\widetilde{\omega} \in L_2[0,\infty]$, the following inequality holds:

$$\int_0^\infty e^{-\epsilon s} e^T(s) ds \leq y^2 \int_0^\infty \widetilde{\omega}^T \widetilde{\omega}(s) ds \tag{13}$$

Filter performance analysis and proof

Theorem 4 considers the filter error systems (7) to (9), so the matrix inequalities (1) to (5) hold when i,j ∈ I,i ≠j.

$$P_{i,1} - v_i P_{i,0} \leq 0 \tag{14}$$

$$P_{i,1} - v_i P_{i,0} \leq 0 \tag{15}$$

$$\begin{bmatrix} \prod_1 & P_{i1}\tilde{B}_{i,j,1} & P_{i1}\tilde{B}_{\omega i,j,1} & \tilde{C}_{i,j,1}^T & k\bar{C}_i^T\psi_j \\ * & -\psi_j & 0 & D_{fj,1}^T & -k\psi_j \\ * & * & -y^2 I & \widetilde{D}_{\omega i,j,1}^T & k\bar{D}_i^T\psi_j \\ * & * & * & -I & 0 \\ * & * & * & * & -k\psi_j \end{bmatrix} < 0 \tag{16}$$

$$\begin{bmatrix} \prod_2 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1} & \tilde{C}_{i,i,1}^T & k\bar{C}_i^T\psi_i \\ * & -\psi_i & 0 & D_{fj,1}^T & -k\psi_i \\ * & * & -y^2 I & \widetilde{D}_{\omega i,i,1}^T & k\bar{D}_i^T\psi_i \\ * & * & * & -I & 0 \\ * & * & * & * & -k\psi_i \end{bmatrix} < 0 \tag{17}$$

$$\begin{bmatrix} \prod_3 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1} & \tilde{C}_{i,i,1}^T & k\bar{C}_i^T\psi_i \\ * & -\psi_i & 0 & D_{fj,1}^T & -k\psi_i \\ * & * & -y^2 I & \widetilde{D}_{\omega i,i,1}^T & k\bar{D}_i^T\psi_i \\ * & * & * & -I & 0 \\ * & * & * & * & -k\psi_i \end{bmatrix} < 0 \tag{18}$$

Among them,

$$\prod_1 = P_{i,l}\tilde{A}_{i,j,l} + \tilde{A}_{i,j,l}^T P_{i,l} - \beta_i P_{i,l}$$
$$\prod_2 = P_{i,l}\tilde{A}_{i,i,l} + \tilde{A}_{i,i,l}^T P_{i,l} - \alpha_{i,l} P_{i,l}$$
$$\prod_3 = P_{i,l}\tilde{A}_{i,i,l} + \tilde{A}_{i,i,l}^T P_{i,l} - \alpha_{i,1} P_{i,l}$$

Thus, in the two synchronous and one asynchronous cases, when the arbitrary sampled signal satisfies (9), the filter error systems (7) to (9) are GUES with a weighted H_∞ performance index y.

Proof: The proof in this section divides all complex asynchronous possibilities into the following five cases: two synchronous cases, one asynchronous case, the case at the moment of virtual switching, and the case where the i-th subsystem switches. Without loss of generality, $t \in T_{as}$ is considered.

$$\dot{V}_{i,l}(t)-\beta_i V_{i,l}(t)+\Gamma(t)$$
$$\leq 2\xi^T P_{i,l}\dot{\xi}-\beta_i\xi^T P_{i,l}\xi+e^T(t)e(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)$$
$$+k\left[y(t)-e_y(t)\right]^T\psi_j\left[y(t)-e_y(t)\right]-e_y^T\psi_j e_y(t)$$
$$=2\xi(t)^T P_{i,l}\left(\tilde{A}_{i,i,l}\xi(t)+\tilde{B}_{i,i,l}e_y(t)\right)+\tilde{B}_{\omega i,i,l}e_y(t)\widetilde{\omega}(t)$$
$$+\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)^T$$
$$\times\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)$$
$$+k\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)-e_y(t)\right)^T\psi_i\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)\right)$$
$$-e_y(t)-\beta_i\xi^T(t)P_{i,l}\xi(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)-e_y^T\psi_i e_y(t)$$
$$=\eta^T(t)\breve{\Omega}_{i,i,l}\eta(t) \quad (19)$$

Among them,

$$\eta(t)=\begin{bmatrix}\xi^T(t) & e_y^T(t) & \widetilde{\omega}(t)\end{bmatrix}^T$$
$$\bar{C}_i=[C_i \quad 0],\bar{D}_i=[0 \quad D_i]$$
$$\breve{\Omega}_{1i,j,l}=\begin{bmatrix}\tilde{C}_{i,j,l} & D_{fj,1} & \widetilde{D}_{\omega i,j,1}\end{bmatrix}$$
$$\breve{\Omega}_{2i}=[\tilde{C}_i \quad -I \quad \widetilde{D}_i]$$
$$\breve{\Omega}_{i,j,l}=\begin{bmatrix}\prod_1 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1}\\ * & -\psi_i & 0\\ * & * & -y^2 I\end{bmatrix}+\Omega_{1i,i,l}^T\Omega_{1i,i,l}+k\Omega_{2i}^T\psi_i\Omega_{2i}$$
$$=\begin{bmatrix}\prod_1 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1} & \tilde{C}_{i,i,1}^T & k\bar{C}_i^T\psi_i\\ * & -\psi_i & 0 & D_{fj,1}^T & -k\psi_i\\ * & * & -y^2 I & \widetilde{D}_{\omega i,i,1}^T & k\bar{D}_i^T\psi_i\\ * & * & * & -I & 0\\ * & * & * & * & -k\psi_i\end{bmatrix} \quad (20)$$

and

$$\prod_1=P_{i,l}\tilde{A}_{i,j,l}+\tilde{A}_{i,j,l}^T P_{i,l}-\beta_i P_{i,l}$$

Similarly, in $t\in\hat{T}_s$, using the same method, the derivation of the Lyapunov function is as (21):

$$\dot{V}_{i,l}(t)-\alpha_{i,1}V_{i,l}(t)+\Gamma(t)$$
$$\leq 2\xi^T P_{i,l}\dot{\xi}-\beta_i\xi^T P_{i,l}\xi+e^T(t)e(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)$$
$$+k\left[y(t)-e_y(t)\right]^T\psi_j\left[y(t)-e_y(t)\right]-e_y^T\psi_i e_y(t)$$
$$=2\xi(t)^T P_{i,l}\left(\tilde{A}_{i,i,l}\xi(t)+\tilde{B}_{i,i,l}e_y(t)\right)+\tilde{B}_{\omega i,i,l}e_y(t)\widetilde{\omega}(t)$$
$$+\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)^T$$
$$\times\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)$$
$$+k\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)-e_y(t)\right)^T\psi_i\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)\right)$$
$$-e_y(t)-\beta_i\xi^T(t)P_{i,l}\xi(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)-e_y^T\psi_i e_y(t)$$
$$=\eta^T(t)\breve{\Omega}_{i,i,l}\eta(t) \quad (21)$$

Among them,

$$\breve{\Omega}_{i,i,l}=\begin{bmatrix}\prod_3 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1}\\ * & -\psi_i & 0\\ * & * & -y^2 I\end{bmatrix}$$

$$+\Omega_{1i,i,l}^T\Omega_{1i,i,l}+k\Omega_{2i}^T\Omega_{2i}$$

$$=\begin{bmatrix}\prod_3 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1} & \tilde{C}_{i,i,1}^T & k\bar{C}_i^T\psi_i \\ * & -\psi_i & 0 & D_{fj,1}^T & -k\psi_i \\ * & * & -y^2I & \tilde{D}_{\omega i,i,1}^T & k\bar{D}_i^T\psi_i \\ * & * & * & -I & 0 \\ * & * & * & * & -k\psi_i\end{bmatrix}(22)$$

and

$$\prod_2=P_{i,l}\tilde{A}_{i,i,l}+\tilde{A}_{i,i,l}^TP_{i,l}-\alpha_{i,l}P_{i,l}$$

Similarly, when $t\in\hat{T}_s$, the Lyapunov function can be expressed as formula (23):

$$\begin{aligned}&\dot{V}_{i,l}(t)-\alpha_{i,1}V_{i,l}(t)+\Gamma(t)\\&\le 2\xi^TP_{i,l}\dot{\xi}-\beta_i\xi^TP_{i,l}\xi+e^T(t)e(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)\\&+k\left[y(t)-e_y(t)\right]^T\psi_j\left[y(t)-e_y(t)\right]-e_y^T\psi_ie_y(t)\\&=2\xi(t)^TP_{i,l}\left(\tilde{A}_{i,i,l}\xi(t)+\tilde{B}_{i,i,l}e_y(t)\right)+\tilde{B}_{\omega i,i,l}e_y(t)\widetilde{\omega}(t)\\&+\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)^T\\&\times\left(\tilde{C}_{i,i,l}\xi(t)+D_{fj,l}e_y(t)+\widetilde{D}_{\omega i,i,l}\widetilde{\omega}(t)\right)\\&+k\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)-e_y(t)\right)^T\psi_i\left(\bar{C}_i\xi(t)+\widetilde{D}_i\widetilde{\omega}(t)\right)\\&-e_y(t)-\beta_i\xi^T(t)P_{i,l}\xi(t)-y^2\widetilde{\omega}^T\widetilde{\omega}(t)-e_y^T\psi_ie_y(t)\\&=\eta^T(t)\hat{\Omega}_{i,i,l}\eta(t)(23)\end{aligned}$$

Among them,

$$\hat{\Omega}_{i,i,l}=\begin{bmatrix}\prod_3 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1}\\ * & -\psi_i & 0\\ * & * & -y^2I\end{bmatrix}$$

$$+\Omega_{1i,i,l}^T\Omega_{1i,i,l}+k\Omega_{2i}^T\Omega_{2i}$$

$$=\begin{bmatrix}\prod_3 & P_{i1}\tilde{B}_{i,i,1} & P_{i1}\tilde{B}_{\omega i,i,1} & \tilde{C}_{i,i,1}^T & k\bar{C}_i^T\psi_i \\ * & -\psi_i & 0 & D_{fj,1}^T & -k\psi_i \\ * & * & -y^2I & \tilde{D}_{\omega i,i,1}^T & k\bar{D}_i^T\psi_i \\ * & * & * & -I & 0 \\ * & * & * & * & -k\psi_i\end{bmatrix}(24)$$

and

$$\prod_3=P_{i,l}\tilde{A}_{i,i,l}+\tilde{A}_{i,i,l}^TP_{i,l}-\alpha_{i,1}P_{i,l}$$

By Schur's complement theorem, $\Omega_{i,j,l},\breve{\Omega}_{i,j,l},\hat{\Omega}_{i,j,l}<0$ can be obtained.

When t is the switching time t_i+T_σ, formula (23) holds:

$$\begin{aligned}&V_{i,1}(t)-v_iV_{i,0}(t)\\&=x^T(t)P_{i,1}x(t)-v_ix^TP_{i,0}x(t)\le 0\end{aligned}\quad(25)$$

Therefore,

$$P_{i,1}-v_ix^TP_{i,0}\le 0\quad(24)$$

When t is the switching time t_i, formula (26) holds:

$$V_{i,0}(t)-v_iV_{j,1}(t)$$

$$= x^T(t)P_{i,0}x(t) - u_i x^T P_{j,1} x(t) \leq 0 \quad (26)$$

Therefore,

$$P_{i,0} - u_i x^T P_{j,1} \leq 0 \quad (27)$$

At this point, the proof ends.

3CROSS-CULTURAL TEACHING SYSTEM FOR INTERNATIONAL STUDENTS BASED ON CLOUD SERVICE PLATFORM

It is essential for cloud service cluster performance optimization strategy. The cloud server cluster needs to have better reliability and availability, and the cloud service platform should provide load balancing functions to cope with changes in user needs.In this paper, the service capacity is adjusted in a horizontal elastic scaling manner to ensure the service quality. Moreover, this part of the optimization is to optimize the cloud service front load balancer algorithm.User requests arrive at the LVS cluster, and the requests are distributed to real servers through servers and backup machines acting as load balancers. After that, the real server processes the request normally, runs the internal application logic, and returns the output result to the load balancer. After processing all sub-requests uniformly, it will return to the client on the network according to the incoming route.The LVS cluster server architecture diagram is shown in Figure 6.

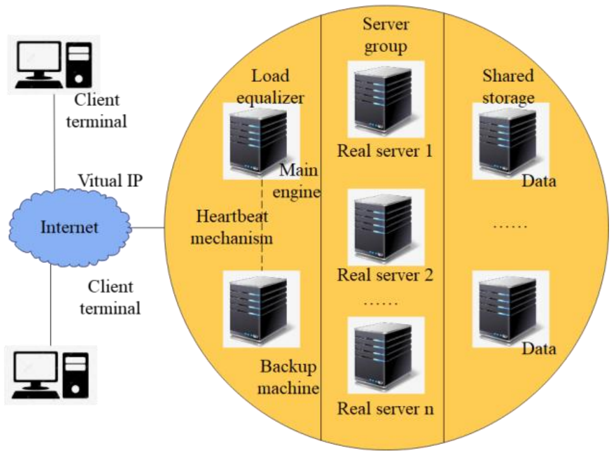

Figure 6 LVS cluster server architecture diagram

The business process of the intelligent cloud service platform system is shown in Figure 7.

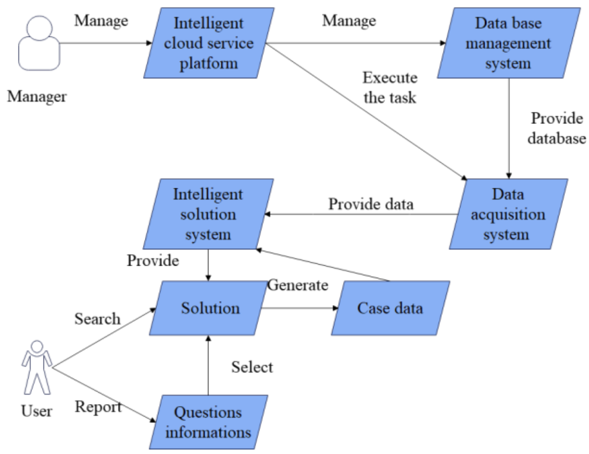

Figure 7 System business process

The overall architecture of the system in this study is shown in Figure 8. The system user operates the Web front-end interface and sends a request to the application server. If it is a general request, the application server directly processes the request according to the local database data and returns the result to the front-end interface. If it is a retrieval request, the application server forwards the retrieval request, and the engine cloud server retrieves the pushed resource content and returns the result to the application server. Then, the application server processes the result and returns the information to the front-end interface, so that the user can obtain the required information content from the front-end interface.

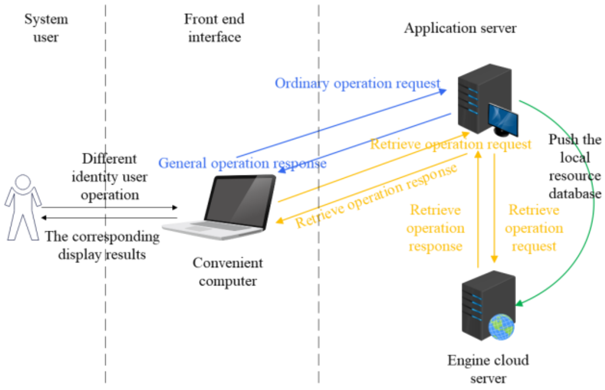

Figure 8 System architecture diagram

After constructing the cross-cultural teaching system for international students based on the cloud service platform, this paper trains it in combination with the actual teaching model, and obtains the clustering relationship between the number of training and the training effect, as shown in Figure 9.

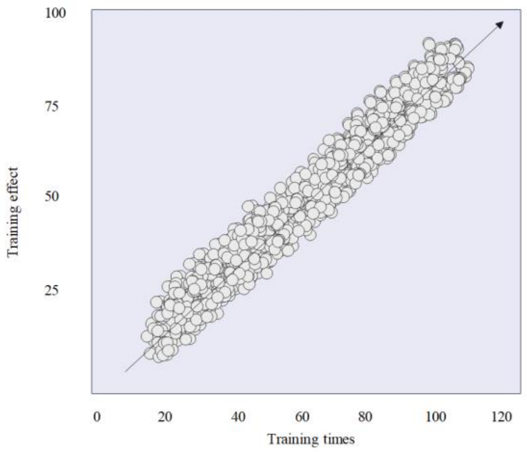

Figure 9 Clustering relationship between training times and training effects

The above research shows that the cross-cultural teaching system for international students based on the cloud service platform has good learning and training effects. After that, this paper conducts the effect verification of the cross-cultural teaching system for international students based on the cloud service platform to evaluate the effectiveness of the system. The following table 1 shows the data statistics of the evaluation results.

Table 1 Validation effect of teaching system

Number	Teaching system verification	Number	Teaching system verification
1	86.67	16	86.22
2	85.73	17	90.92
3	88.29	18	84.82
4	88.72	19	89.12
5	84.12	20	88.71
6	86.59	21	86.93
7	84.49	22	86.21
8	84.85	23	90.18

9	87.09	24	90.55
10	90.42	25	88.42
11	88.09	26	88.62
12	87.37	27	89.14
13	87.05	28	86.63
14	83.85	29	89.76
15	83.63	30	84.74

It can be seen from the above research that the cross-cultural teaching system for international students based on the cloud service platform can effectively improve the efficiency of cross-cultural teaching.

4 CONCLUSION

The cultivation of cross-cultural awareness is a comprehensive project, which is the cultivation of cultural qualities, not the training of language or communication skills. The position of English teachers who impart knowledge is particularly important, and it is necessary to continuously improve their cultural literacy. They need to receive professional cultural training, learn English cultural courses, and have a deep and detailed understanding of the history, culture, tradition, customs, lifestyle and even details of life in English-speaking countries, so as to create conditions for improving English teaching. Moreover, culture is the essence of language, and language is the embodiment of culture.This paper combines the cloud service platform to conduct research on the cross-cultural teaching of international students, and explores to improve the effect of cross-cultural teaching for international students. The research shows that the cross-cultural teaching system for international students based on the cloud service platform can effectively improve the efficiency of cross-cultural teaching.

ACKNOWLEDGE:

Research on the digital protection and transmission of Henan Folk culture Under the background of Internet plus(No.2022XWH175).

REFERENCES

[1] Lappalainen, S., Nylund, M., & Rosvall, P. Å. (2019). Imagining societies through discourses on educational equality: A cross-cultural analysis of Finnish and Swedish upper secondary curricula from 1970 to the 2010s. European educational research journal, 18(3), 335-354.

[2] Loinaz, E. S. (2018). Towards a Cross-Cultural Conceptual Framework for Researching Social and Emotional Education. IAFOR Journal of Education, 6(3), 111-127.

[3] Shin, S., Rachmatullah, A., Roshayanti, F., Ha, M., & Lee, J. K. (2018). Career motivation of secondary students in STEM: a cross-cultural study between Korea and Indonesia. International Journal for Educational and Vocational Guidance, 18(2), 203-231.

[4] Luz, C., Cordovil, R., Rodrigues, L. P., Gao, Z., Goodway, J. D., Sacko, R. S., ... & Stodden, D. F. (2019). Motor competence and health-related fitness in children: a cross-cultural comparison between Portugal and the United States. Journal of sport and health science, 8(2), 130-136.

[5] Richards, C. (2019). Later life learning from experience: the cross-cultural importance of 'life reviews' in seniors' lifelong education and learning. Zeitschrift für Weiterbildungsforschung, 42(1), 5-22.

[6] Kwon, J. (2019). Third culture kids: Growing up with mobility and cross-cultural transitions. Diaspora, Indigenous, and Minority Education, 13(2), 113-122.

[7] Marsh, H. W., Parker, P. D., Guo, J., Pekrun, R., & Basarkod, G. (2020). Psychological Comparison Processes and Self–Concept in Relation to Five Distinct Frame–Of–Reference Effects: Pan–Human Cross–Cultural Generalizability over 68 Countries. European Journal of Personality, 34(2), 180-202.

[8] Wu, M., & Hu, Y. (2020). Transitioning to an independent researcher: Reconciling the conceptual conflicts in cross-cultural doctoral supervision. Studies in Continuing Education, 42(3), 333-348.

[9] Wang, Y., Li, T., Noltemeyer, A., Wang, A., Zhang, J., & Shaw, K. (2018). Cross-cultural adaptation of international college students in the United States. Journal of international students, 8(2), 821-842.

[10] Varga, Z., McGuinn, N., Naylor, A., Rimmereide, H. E., & Syed, G. K. (2020). We are invited to imagine: Using a literary text to encourage cross-cultural dialogue about citizenship. Cambridge Journal of Education, 50(4), 501-519.

[11] Desai, S. V., Jabeen, S. S., Abdul, W. K., & Rao, S. A. (2018). Teaching cross-cultural management: A flipped classroom approach using films. The International Journal of Management Education, 16(3), 405-431.

[12] Charoensukmongkol, P. (2020). The efficacy of cultural intelligence for adaptive selling behaviors in cross-cultural selling: The moderating effect of trait mindfulness. Journal of Global Marketing, 33(3), 141-157.

[13] Lucchetti, G., Damiano, R. F., DiLalla, L. F., Lucchetti, A. L. G., Moutinho, I. L. D., da Silva Ezequiel, O., & Kevin Dorsey, J. (2018). Cross-cultural differences in mental health, quality of life, empathy, and burnout between US and Brazilian medical students. Academic Psychiatry, 42(1), 62-67.

[14] Almoshmosh, N., Bahloul, H. J., Barkil-Oteo, A., Hassan, G., & Kirmayer, L. J. (2019). Mental health of resettled Syrian refugees: a practical cross-cultural guide for practitioners. The Journal of Mental Health Training, Education and Practice, 15(1), 20-32.

[15] Nordin, N., & Norman, H. (2018). Cross-culture learning via massive open online courses for higher education. Jurnal Pendidikan Malaysia [Malaysian Journal of Education], 43(1), 35-39.

[16] Visser, A. E., Rooney, J. P., D'Ovidio, F., Westeneng, H. J., Vermeulen, R. C., Beghi, E., ... & Van Den Berg, L. H. (2018). Multicentre, cross-cultural, population-based, case–control study of physical activity as risk factor for amyotrophic lateral sclerosis. Journal of Neurology, Neurosurgery & Psychiatry, 89(8), 797-803.

[17] Koç, V., & Kafa, G. (2019). Cross-cultural research on psychotherapy: the need for a change. Journal of Cross-Cultural Psychology, 50(1), 100-115.

[18] Boer, D., Hanke, K., & He, J. (2018). On detecting systematic measurement error in cross-cultural research: A review and critical reflection on equivalence and invariance tests. Journal of Cross-Cultural Psychology, 49(5), 713-734.

[19] Satyen, L., Rogic, A. C., & Supol, M. (2019). Intimate partner violence and help-seeking behaviour: A systematic review of cross-cultural differences. Journal of immigrant and minority health, 21(4), 879-892.