Virtual HRD and national culture: an information processing perspective

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Abstract

Purpose – The purpose of this study is to provide researchers with a better understanding of the cultural impact on information processing in virtual learning environment.

Design/methodology/approach – This study uses a causal loop diagram to depict the cultural impact on information processing in the virtual human resource development (VHRD) learning platform. This study takes a theoretical approach and examines current literature pertaining to VHRDs, virtual worlds (VWs), system dynamics, causal loop diagrams (CLDs) and cross-cultural studies.

Findings – This study provides a conceptual model to describe and discuss the cultural impact on information processing in VHRD.

Research limitations/implications – Literature has begun to reflect the concerns with cultural impact in VHRD; however, research is still in the beginning stages. This study proposes a conceptual model of information processing that includes the cultural impact. Future work based on this study will continue to test and improve the conceptual model.

Practical implications – The conceptual model accounts for the complexities of the interaction between internal and external information processing systems. Instructional designers or educators can apply this conceptual model to understand the impact of culture on information process during training programs in the VHRD environment. With this model, they could provide an effective or efficient training programs for their trainees.

Social implications – The conceptual model adopts a systemic viewpoint to describe the cultural impact on VHRD. For future studies, researchers could adopt this conceptual model to further illustrate the association between understanding information processing and recognizing the cultural impact on information processing.

Originality/value – This study provided a framework for HRD researchers and practitioners to detect challenges and opportunities to work with cultural impact on information processing in VHRD. Instructional designers or educators could utilize this model to understand the process, and further offer an effective or efficient training programs for their trainees.

Keywords System dynamics, Information processing, Cross-cultural studies, Causal loop diagrams, Virtual human resource development, Virtual worlds (VWs)

Paper type Conceptual paper

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Introduction

Over the past decade, virtual worlds (VWs) have become increasingly popular, having various applications in many fields (Zhou *et al.*, 2011), including human resource development (HRD) (Bennett and Bierema, 2011; Condic, 2009). By providing a virtual environment with three-dimensional (3D) capabilities, VWs enable multiple users to simultaneously access contents and collaborate in learning activities through their avatars (Li and D'Souza, 2011). VWs influence traditional educational activities and will become a future trend in e-learning (Firat and Firat, 2010).

HRD facilitates "organization learning activities arranged within an organization to improve performance" (Gilley *et al.*, 1989). Many studies have taken notice of the impact of VWs in the field of HRD (Bennett and Bierema, 2011; Condic, 2009). Recently, the journal of *Advances in Developing Human Resources* has published several special issues to explore the concepts of VHRD. VHRD has emerged as a new area of inquiry in the field of HRD (McWhorter, 2011). VHRD is an operational aspect of technological development. Due to the fact that it integrates career development, organizational development and training and development (Bennett, 2011), VHRD "is playing an important role in improving learning capacity and performance" (Bennett, 2014a; Evans, 2014). However, VHRD includes complex interactions between learners and trainers. It is not simply integrated by the VWs into HRD (Bennett, 2014a). For this reason, it is necessary to discuss the learning process of VHRD.

Virtual worlds help organizers to overcome many spatial limitations and allow individuals from various national cultures and backgrounds to connect in the same virtual space. Researchers of cultural adaptation have suggested that different cultures are likely to influence the specific forms of HRD applications, such as the design of training programs (Jie and Lang, 2009; Watson *et al.*, 1993). Individuals from different cultures may have differing preferred learning styles (Holtbrügge and Mohr, 2010; Nield, 2009; Olaniran, 2009). To reduce barriers in learning performance, VHRD designers must consider the importance of the influence of the learner's culture and learning preference (Bennett, 2009). Bennett (2009) further states that VHRD has a complex and dynamic interaction with the organizational knowledge continuum. To study the impact of cultural influence on the organization learning continuum created by a virtual environment, a system dynamics model is chosen for this study. System dynamics is often used to understand and analyze behaviors in a complex system (Murthy *et al.*, 2010). This study adopts system dynamics for the development of an initial conceptual model of the cultural impact on information processing within a VHRD learning platform.

In this study, the authors present a causal loop diagram (CLD) depicting the cultural impact on information processing within a VHRD learning platform. This CLD provides an approach to explain and develop the conceptual model. Furthermore, it provides initial answers to the research question, i.e. "What types of cultural information processes occur when individuals use a VHRD learning platform?"

To answer the question, the authors adopted and integrated two theories – information processing and cross-cultural adaptation – for their initial theoretical framework. This conceptual framework (which guides the examination of current literature pertaining to VWs, VHRDs and cross-cultural studies) is presented in Figure 1. This indicates that four important factors generate the dynamic process of information sharing in the organizational learning causal loop:

(1) the usefulness of VHRD;
(2) information processing;
(3) cultural adaptiveness; and
(4) user interaction.

The authors hope that the results will provide researchers with a better understanding of the cultural impact on information processing in a virtual learning environment. The implications of VHRD research and practice are also discussed. The literature review section discusses additional details and explains the cultural impact on information processing in VHRD.

Literature review

This section discusses the VHRD background, the cross-cultural adaptation and the information processing theory. Due to the complexity of cultural issues, a CLD is used to depict the phenomena of cultural information processing in virtual learning environments. In addition, the general system theory and system dynamics are also discussed in the literature review section.

Definition of culture and virtual human resource development

The topic of culture has been broadly discussed across various fields, including sociology, linguistics, medicine, economics and humanities. The definition of culture is multifaceted; however, in the HRD field, Hofstede (1998, p. 478) defined it as:

> The collective programming of the human mind that distinguishes the members of one human group from those of another. Culture in this sense is a system of collectively held values.

This definition provides a clear, basic concept of culture in HRD. Therefore, this paper adopts Hofstede's (1998) definition of culture for the study of the impact of national culture in VHRD.

Bennett (2009, p. 364) defined VHRD as "a media-rich and culturally relevant web environment that strategically improves expertise, performance, innovation, and community building through formal and informal learning". This paper adopts this definition for research concern the cultural impact on VHRD. To conduct an in-depth investigation into cultural differences, this paper also defines "culture shock", based on the study of Flanja (2009). Culture shock is a phenomenon caused by unfamiliarity and difficulty or not knowing how to perform appropriate behaviors in an unfamiliar

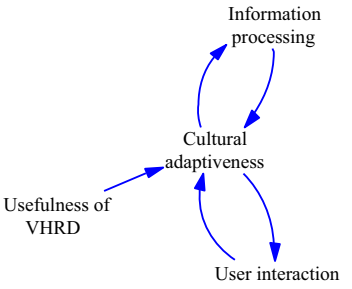


Figure 1.
Initial conceptual model of cultural impact on information processing in VHRD

culture. Newcomers sometimes feel awkward because they have difficulty understanding new things in unfamiliar cultures (Flanja, 2009).

The development of VWs

With the continuing development of Internet technology, VWs have rapidly become an important extension of people's lives (Zhang *et al.*, 2010). The VW provides a diverse, real-time social and economic interaction platform for individuals. Second Life is an example of this type of platform. The total number of residents in Second Life was 43,558,339 as of October 12, 2015 (Second Life Grid Survey – Region Database, 2015). Several educational and commercial interactive activities have been developed for Second Life; for example, the Japanese automotive company Toyota built a virtual store in Second Life to show off their Scion xB model (Kaplan and Haenlein, 2009). Furthermore, many higher education organizations have established Second Life University Islands, such as the University of Texas at Dallas, the University of North Texas, the University of Florida and the University of Southern California. Meanwhile, the virtual game community has been growing exponentially, and educators have been attempting to tap into it for education and learning purposes. Many organizations have seen the potential of VWs for simulation of real-life experiences. Therefore, various companies and institutions are finding ways to reach an audience through VW environments.

One of the most important factors causing the closure of the Google Lively product was the inflexibility of this VW. In contrast to Google's VW, Second Life offers a flexible setting, such as changing appeals and users' objects, and allows individuals to copyright anything they create. In addition, Second Life allows these individuals, or "residents", to sell their contents, and it provides more flexible functions for expression, such as online exhibits and the design of landmarks.

Although HRD in the VW has become an increasingly popular research topic (Bennett and Bierema, 2011), few studies have focused on identifying important factors influencing the learning performance in VWs. One influential factor is related to cultural differences, as although virtual worlds overcome the limitation of physical space, they must still work with the cultural differences of the participants. The cultural impact on HRD in VWs should be explored and discussed by educators (Mockaitis *et al.*, 2012). Shachaf's (2008) study revealed that cultural diversity has a significant impact on decision-making, communication and media selection. Therefore, there are theoretical and practical implications to explore to understand the impact of cultural factors in VWs.

The development of VHRD

Researchers have become increasingly interested in the impact of VWs within the field of HRD (Bennett and Bierema, 2011). While researchers appear to agree that VWs play an important role in HRD, opinions differ on how to resolve their limitation problems (Mancuso *et al.*, 2011). These limitations include technical problems and inadequate support for the equipment. Certain researchers advocate for technology development to improve the effectiveness and efficiency of VWs, and insist that VHRD can promote learning performance (Bennett, 2014b; Nafukho *et al.*, 2011). McWhorter (2011) concludes that VHRD has emerged as a new area of inquiry in the field of HRD.

The cultural impact on VHRD

The growth of globalization has motivated many people to study abroad to gain a wide range of experiences and to interact with people from different countries. The Internet also has the capacity to connect people from all over the world, through the form of VWs. Due to the popularity of 3D online games and social networks, people are adapting to the VW environment (Bainbridge, 2010).

Students and employees who travel abroad often experience culture shock; however, the VW can create experiences that may help lessen culture shock by familiarizing individuals with foreign cultures – especially before they travel to other countries (De Lera *et al.*, 2010). Irrespective of participants' location in the world, individuals can arrange meetings at any time in VWs (Dekker *et al.*, 2008).

The development of the Internet has helped to eliminate the feeling of distance between different countries; however, the Internet may create a problem for some individuals, i.e. the lack of meaningful interactions. Certain people may feel that they are part of an imaginary relationship on a machine instead of connecting or interacting with real people. To prevent feelings of disconnection, researchers and programmers have tried to design a friendly virtual world for users (Bruno and Muzzupappa, 2010). Several researchers have proposed complex user interactions between societies in the VW, such as Second Life or World of Warcraft, and the impact of these types of interactions should continue to be examined. For example, users could asynchronously and synchronously communicate with others. Compared with the real world, VWs could provide more diverse activities. These activities could also increase the ways that users interact. For these types of interactions, cultural impact would influence the behaviors of users (De Lera *et al.*, 2010).

Understanding how individuals adapt to different cultures can aid programmers who design learning environments with friendly interfaces (McWhorter, 2011). Cultural differences were one of the most important factors influencing an individual's intention to use VWs (Venkatesh *et al.*, 2012). Culture shock may help people become more creative in overcoming the differences, yet large differences between cultures may negatively impact personal learning performances (Bennett and Bierema, 2011). For example, many international students come to the USA to study and they experience different cultures. Culture shock encourages certain students to adopt creative behavior to adapt to a new environment. However, large differences between cultures compel international students to spend a significant amount of time trying to adapt, and this lowers their learning performance.

Cultural impact also interacts with knowledge management. In VHRD, knowledge management plays an important role in managing learners or organizational learning processing. Reducing the barriers of organizational culture, VHRD could effectively and efficiently promote organizational learning performance (Bennett, 2014b). Furthermore, based on a study by Holtbrügge and Schillo (2008), the better culture adaptation an organization has, the more effective virtual teams they have. According to the study of Workman (2005), negative cultural impact may cause a virtual team to incur a number of errors, which decreases the quality of work performance. His study reveals that appropriate cultural adaptation had a positive relationship on virtual teams' project schedules and quality of performance.

Aside from formal learning, information learning in VHRD is also one of the critical factors improving learning performance (Bennett, 2014b). With current developments in

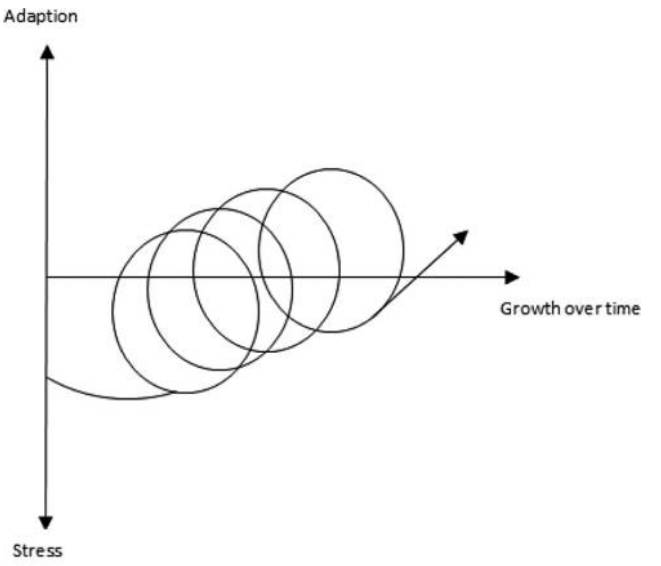
modern technology, users in VHRD environments can utilize multiple technologies to increase their knowledge, such as Facebook, Blogger or other social media. In the informal learning environment, learners use social media to share ideas or learn new ideas from others (McWhorter, 2011). In VHRD, learning processes become very complex as we consider cultural impact. These processes may negatively impact their learning performance; therefore, understanding the culture adaptation process in the VW can be helpful when designing a user-friendly environment for learning purposes to be utilized by diverse cultures. Furthermore, instructional designers or educators could design suitable training programs in a VHRD environment.

Cross-cultural adaptation

Cross-cultural adaptation has been discussed in a number of studies over recent decades (Brettel and Spilker-Attig, 2010; Pflug, 2011). Kim and Ruben (1988, p. 408) defined cultural adaptation as:

> […] the process of change over time that takes place within individuals who have completed their primary socialization process in one culture and then come into continuous, prolonged first-hand contact with a new and unfamiliar culture.

In addition, they proposed cross-cultural adaptation theory as a cooperative joint effort between individuals facing unfamiliar environments. Figure 2 presents the cyclical processes in the cross-cultural adaptation theory. This theory highlights the importance of the environment and other major factors that influence individuals as they adapt to different cultures. As new events occur, individuals will adapt to the new situations by changing their behaviors. This process is applicable not only for new situations, but to new cultures also. A study conducted by Haslberger (2005) presented a new concept of



Source: Adapted from Kim and Ruben (1988)

Figure 2.
Stress-adaptation-growth dynamic

cross-cultural adaptation theory that considered scales of factors, such as novelty, discretion, self-efficacy and social networks. These scales describe how cultural differences influence behaviors in different cultural environments. Haslberger also indicated that the cross-cultural adaptation process that is used to function effectively in a different culture is complex. While engaging in this complex process, people attempt to change their behaviors to adapt to different cultures.

Information processing theory

The information processing theory describes the process by which environmental events influence people to encode information to be learned, to memorize the knowledge, to store new knowledge in their long-term memory and to apply the new knowledge (Ozcelik and Yildirim, 2005). In information processing theory, the unit is a system of receiving, processing and storing symbols. By operating this system, an individual can transfer the external knowledgeable entity to personal, internal and knowledgeable characterization. Personal knowledge is obtained when an individual uses their learning experience to transfer the external information to their internal knowledge (Driscoll, 1994).

Figure 3 shows the flow of information in the information process theory. This theory has been broadly applied to distance learning and the description of trainees' learning experiences. Zhang and Zhang (2010) proposed a new information processing model for e-learning. Their models included multimedia and cognitive tools in e-learning and describe how one can positively influence the information learning process. However, the model is oriented toward the Web 2.0 platform as opposed to the virtual world learning environment. Consequently, this paper has adopted information processing theory with the intention of developing a modified model to describe learning behavior in the virtual world environment.

System dynamics

System dynamics was developed in the 1950s as a method to aid managers by enhancing their understanding of business processes (Forrester, 1968). Researchers use system dynamics to show the methodology and modeling techniques for framing, understanding and discussing the behavior of complex dynamic systems and problems (Aburawi and Hafeez, 2009; Liu *et al.*, 2012). This method has been applied to ecosystem models, population dynamics, healthcare systems and software engineering (Murthy *et al.*, 2010). Lane (2008, p. 4) states that:

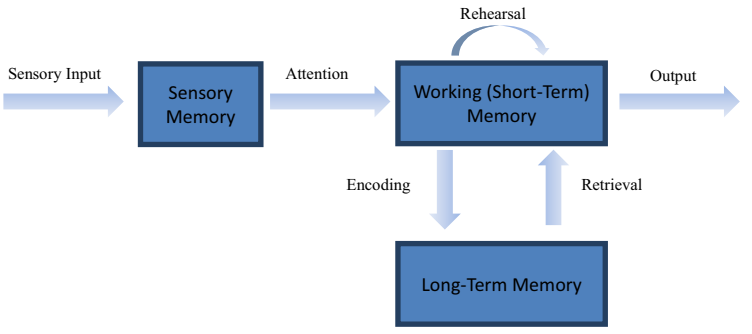


Figure 3.
Information processing theory

> […] system dynamics is a form of computer simulation modeling which uses the concepts of information feedback and state variables to model social systems and to explore the link between system structure and time evolutionary behavior.

However, little research has focused on system dynamics in business intelligence. With technological developments and changes in societal structure, various kinds of social problems become more complex (Liu *et al.*, 2012). The system dynamics method can be utilized to understand these complex problems and to improve analysis and modeling procedures.

System dynamics research can be used to analyze large, complex, nonlinear systems. The system dynamics method, which involves feedback and interaction, includes qualitative and quantitative analysis approaches to analyzing problems in these complex systems. The system dynamics approach is based on the cause-and-effect relationship and on structure decision behavior, such as the relationships between labor costs and work schedule, (Liu *et al.*, 2012) as illustrated by the following CLD.

The causal loop diagram

System dynamics uses the CLD to analyze, and to be utilized as a test bed for, complex dynamics problems (Hsieh and Yuan, 2010). The CLD gives expression to two major characteristics of system dynamics – feedback and time delay. A system has feedback loops; therefore, the output variables are dependent on the input variables. Furthermore, the variables of this system have nonlinear interactions. Figure 4 reveals that the feedback loops have a positive and negative influence on the process that is depicted. The plus sign (+) indicates the reinforcing or positive relationship between two variables; the minus sign (−) represents the balancing or negative relationship. Time delay (‖) is also an important property in system dynamics occurring in the complex system; for instance, the water pollution slowly causes many deaths to wildlife. With feedback and delay, CLDs depict the various processes and demonstrate real-time circumstances.

The conceptual model

Based on the literature review, the authors of this paper applied a CLD, to develop a conceptual model to explain the cultural impact on information processing in VHRD. This model combined two major theoretical frameworks, i.e. cross-cultural adaptation

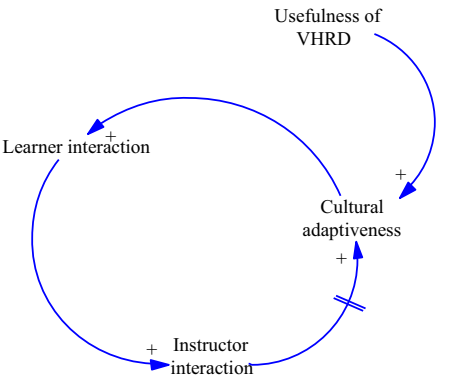


Figure 4.
The interaction between learners and instructors in VHRD

and information processing theory, to discuss the cultural impact in VHRD. Compared with the traditional models, this conceptual model explains the greater cultural impact and interaction between learners and instructors. Each learner and instructor demonstrates a unique way of information processing and thinking, alongside the individual characteristic of his or her culture. These cultural characteristics serve as filters and influence how individuals obtain information from others. Therefore, cultural characteristics can influence an individual's learning performance. The information processing is complex and needs additional exploration. Researchers and designers who fully explore the process will improve learning performance in VHRD.

The interaction between learners and instructors

In formal and informal learning, the process of interaction between learners and instructors is continuously changing. In this process, cultural characteristics influence the way a learner receives information and stores it as knowledge. Instructors use different teaching skills based on their own cultures (Hill *et al.*, 2005). For this reason, learners may obtain unreliable information due to misinterpretation of different culturally based teaching styles. In addition, the cultural impact influences the interaction between the learners, and this process impacts how a learner understands and accepts the shared information.

The usefulness of VHRD is another important factor influencing the interactive processes between learners and instructors. When the VW environment is highly useful, an individual will have more interaction (Bennett, 2009, 2011, 2014; Bennett, 2014a, 2014b). According to the cultural adaptive theory, people's cultural characteristics are constantly adapting to other cultures (Kim and Ruben, 1988). For example, instructors are also influenced by learners from different cultures, at the same time as learners are influenced by each other. Therefore, this process of interaction between instructor and learner is continually changing (Figure 4).

Individual information processing

Cultural impact also plays an important role in influencing individual information processing. When an individual receives information, their cultural background may influence the result of sensory memory, i.e. their behaviors (Cagliano *et al.*, 2011; Kim and Ruben, 1988; Van Oudenhoven, 2009). Over time, the individual's cultural background allows information to be stored in the long-term memory (stereotype). The long-term memory would slowly have a negative impact with cultural adaptation (Kim and Ruben, 1988). Eventually, this stored information allows the sensory memory to be influenced again. The lower the level of cultural adaptation the individual has, the smaller the amount of information they would be able to receive or understand. Furthermore, new information is not easily stored in the long-term memory. The final result causes an individual's learning performance to be worse than that of someone with better cultural adaptation (Holtbrügge and Schillo, 2008). This continuous cycle is an example of a feedback loop. Taking this into consideration, this study demonstrates that the individual's cultural background influences the information processing procedure (see Figure 5).

In Figure 6, the entire CLD shows the cultural impact on information processing in VHRD. The loop diagram reveals how factors will influence each other and are classified into the growth and underinvestment system archetype. The growth of learning

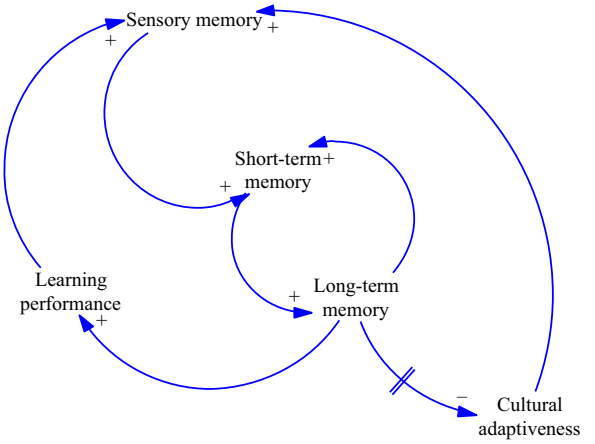


Figure 5.
Individual information processing in VHRD

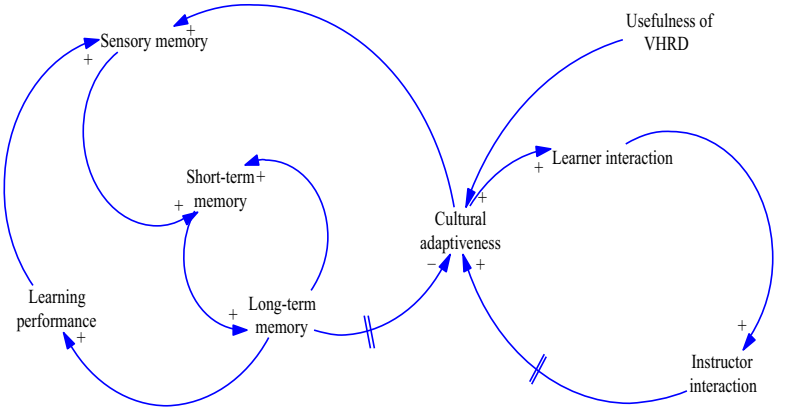


Figure 6.
CLD of cultural impact on information processing in VHRD

performance has a limit, which may possess the ability to be eliminated or progressed in future, if technological development, system designers or instructor designers improve the usefulness of VHRD; this plays an important role in information processing (Bennett, 2009).

Discussion

With the model presented in this study, it is proposed that cultural impacts on VHRD are considered. In this section, we discuss the characteristics of the model, the distribution of information processing in VHRD and the implications and limitations of the conceptual model.

Characteristics of the model

Information in the VHRD environment is presented in non-linearity and hypermedia forms. In VHRD, individuals obtain information without many restrictions. For example, individuals interacting through VHRD can quickly deliver and gather

information from others; also, both needed and needless mass information can be gained at the same time. This situation could result in positive or negative influences for an individual's working or learning performance (Fagan, 2014). For example, individuals could obtain more information without the limitation of time in VHRD. They could log into the VHRD learning systems at any time. However, although this is more convenient, mass information causes individuals to spend more time filtering through needless information, which decreases the performance of the information process. In regard to cultural impact, the information an individual stores as knowledge becomes more complex, as the cultural impact influences how individuals obtain and understand the received information (Workman, 2005).

The distribution of information processing in VHRD

The interaction between individuals is one of the most important factors in VHRD; interaction helps learning activities to continually progress. The VHRD environment increases interaction between people and reduces the limitations caused by time zones and distances. These interactions spread information widely and quickly and help eliminate the gap between current situations and expected learning goals. Compared with a face-to-face interactive approach, VHRD provides an effective and efficient learning process; learners come into contact with individuals from various cultures concurrently, and need to adapt quickly to the cultural differences. The tools within VHRD also have different impacts on these learners as a result of their cultural differences. Not only does the interaction between individuals show the effects of cultural impact, but cultural impact influences the ways in which individuals use tools as well. For example, the traditional Chinese culture influences Chinese students' learning behaviors when enrolling in online courses in the USA during the first year. They felt isolated from other students and rarely allowed any interaction with classmates as using e-learning systems; however, American students had positive feedbacks (Ku and Lohr, 2003). Therefore, the cultural impact plays one of the critical key roles in influencing an individual's learning performance in VHRD.

Information processing construction and cultural impact

The VHRD environment allows the learner to continually exchange information with other individuals. Both internal and external information processing systems have a cycle of information distribution. With this circulation of information, individuals accumulate cultural information and learned knowledge. The cultural impact may have some negative aspects, such as misunderstanding or incomprehension toward the beginning of the learning process; however, the accumulation of cultural information and learned knowledge helps individuals to effectively and efficiently obtain valuable information in VHRD (Workman, 2005).

Implications of the conceptual model for research and practice

Research implications. VHRD integrates technology with traditional HRD processes and activities to improve learning performance (Bennett, 2014b). Furthermore, based on the Knowledge Influence Model proposed by Bennett (2009), cultural impact plays an important role as an influence on organizational knowledge management. As there is a gap in the VHRD literature associated with cultural impact on information processing (acquired knowledge), this paper adopted cross-cultural and information processing theories to explore the impact of culture on information processing in VHRD.

Additionally, the conceptual model accounts for the complexities of the interaction between internal and external information processing systems. An initial conceptual model was proposed for explaining cultural impact on the complex systems of VHRD. Future research should further examine cultural impact in informal and formal learning environments.

Practical implications. The model helps instructional designers and trainers understand the cultural impact of information processing on VHRD, enabling them to offer better educational or training programs to reduce the barriers of cultural adaptation during the individual's learning process within the VHRD learning platform. Based on the model of cultural impact on information processing in VHRD, several suggestions are proposed:

- In the early stages, an individual is strongly influenced by cultural impact. Furthermore, the cultural impact sometimes has a negative influence on a trainee's learning performance. For this reason, instructional designers may provide activities, such as social media or gamification, to increase the user's interactions to help him or her integrate into a new VHRD learning environment.
- Improving the usefulness of VHRD is one of the critical successful factors for decreasing the barriers of negative cultural impact.
- The information processing of cultural impact is a slow cycle of information distribution. However, when continually providing appropriate interaction activities, instructors could help trainees quickly reduce the challenges posed by cultural impact.

In this paper, the conceptual model adopts a systemic viewpoint to describe the cultural impact on VHRD. For future studies, this will further illustrate the association between understanding information processing and recognizing the cultural impact on information processing. As a result, future research could explore the possibility of improving an individual's cultural adaptation in order to increase the learning performance in VHRD. Practically, this model assists people in understanding the cultural impact process in VHRD; by referring to this model, designers of training programs can provide suitable training programs in the VW environment. The conceptualization of the information process that includes the cultural impact on VHRD in this model is still a hypothesis and needs to be empirical analysis. This model will need to be tested in the future.

Conclusion

Cultural impact is one of the most important factors influencing learning performance in a globalized learning environment, such as a VW. The cultural impact on information processing is highly complex – particularly in VHRD. Through a review of current literature, this study provides a conceptual model to describe and discuss the cultural impact on information processing in VHRD. Instructional designers or educators should understand the cultural impact on information processing in VHRD to offer suitable learning activities for learners, and thus learners can improve their learning performance. Literature has begun to reflect the concerns with cultural impact in VHRD; however, research is still in the early stages. This study proposes a conceptual model of information processing that includes the cultural impact. Future work based on this study will continue to test and improve the conceptual model.

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