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Review

Challenges facing Chinese International students studying in the United States

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Chinese international students often find it challenging to adjust to attending college in the United States (US). There is limited research addressing Chinese international college students' adjustment in the US. Drawing on what literature exists combined with research addressing Chinese immigrants' transition and international students' transition, this article examines strategies to help Chinese international students successfully make this adjustment. Educating the Chinese international students, educators and counselors about the challenges as well as offering strategies to overcome these challenges may help students succeed in a new educational system and a new culture.

Key words: Chinese International Students, college adjustment, success strategies for college.

INTRODUCTION

The number of Chinese students who are coming to study in the United States has increased significantly in recent years. According to the statistics provided by the Institute of International Education (2014a), Chinese international students made up 18.5% of the total international student population between the years 2009 and 2010, and the percentage steadily grew to 21.8% between 2010 and 2011, and 25.4% between 2011 and 2012 (Institute of International Education, 2014a). Between 2013 and 2014, the Chinese international students made up 31.0% of the total population of international students in the US, making Chinese students the largest international student group in the US (Institute of International Education, 2014b). As China

rises as one of the major economies in the world, it has become increasingly involved in the wave of globalization and its citizens are seeking opportunities to receive a Western education (Institute of International Education, 2014b).

Even though there is a rapid increase in Chinese international students studying in the US, there is limited research about the adjustment of Chinese international students in the US. Adapting to a new culture is one of the bigger adjustments that must be made when transitioning to college in a new country (Ye, 2006). Different strategies can lead to changes in behaviors that can help support the necessary psychological and sociological adaptations these

students must make (Bertram et al., 2014).

According to Lillyman and Bennett (2014), there are numerous benefits for international students studying abroad. For the Chinese international students, studying abroad offers an exciting opportunity to mix with students and faculty from other countries, which may increase their level of confidence (Warring, 2010). In addition, students' views are challenged as they experience personal development and become independent thinkers and agents for change (Lillyman and Bennett, 2014). Furthermore, due to the education they receive in the US, these students can become globally employable and leaders in their field when they return home (Campbell, 2010).

There are benefits to institutions hosting international students (Lillyman and Bennet, 2014; Perry, 2016). For the host institution, financial gain is one benefit. In 2013, international students contributed approximately $27 billion to the US economy, an increase of $3 billion from the prior year (Institute of International Education, 2014b). Apart from financial gain, other benefits include an increased profile among international students, which can improve the understanding of cross-cultural communication for the host institution. In addition, international students often become involved in the local Chinese life and the local community. This could help the institution become better connected to the local Chinese community. When there is a large population of international students, it may internationalize the program and increase opportunities for international cooperation between different institutions from different countries. This is also a process of internationalization, and the internalization of the institution is likely to improve the international reputation and enhance international cooperation (Lillyman and Bennett, 2014). Having Chinese students on campus also potentially brings an additional ethnic, cultural and global perspective and worldview. This is beneficial to the institution and important to other students in the classroom and learning environment.

THE CHALLENGES

The process of cultural adjustment is viewed as a struggle for young Chinese international students in the United States (Flannery and Wieman, 1989; Hendrickson et al., 2011; Jung et al., 2007). International students may experience cultural shock, among other challenges such as being away from families, and lack of social support, while adapting in the host country (Arasaratnam and Doerfel, 2005; Hendrickson et al., 2011; Smith and Khwaja, 2011; Spencer-Rogers and McGovern, 2002; Williams and Johnson, 2011).

There is substantial research on Chinese immigrant students in the US but a limited number of research articles on international students in the US (Bennett, 2008; Kim et al., 2009; Yeh, 2003; Yeh et al., 2008; Zhang and Goodson, 2011). The research on Chinese immigrant students offers insights about the process of cultural adjustment for the Chinese international students. According to Ye (2006), international students are defined as a special group who live in a foreign country pursuing an educational goal. Unlike immigrants, the majority of international students plan to go back home after they finish their degree.

The Chinese immigrant students, especially those who have arrived in the US recently, may have many similarities with the Chinese international students in terms of previous cultural experience, their identity with the Chinese culture, and language (Tsai et al., 2000). However, these two groups differ in that immigrant students may arrive with their family and are allowed to work in the United States. They may believe there is a need to establish a long-term relationship with the mainstream American culture, whereas international students may be curious about the culture but they do not necessarily intend to stay in the US.

Due to the similarities between Chinese international students and first generation Chinese immigrant students, the findings in the literature can, at times, be generalized to Chinese international students (Tsai et al., 2000). Studies have been implemented to investigate the variables that may influence the process of acculturation in Chinese immigrant students. These variables include language proficiency, age, social support, family support, cultural differences, and years of stay in the host country. In the study of Chinese immigrant students, the search has also focused on the special characteristics of the Chinese culture and the potential identity crisis between the Chinese culture and American culture (Kwan and Sodowsky, 1997).

ADAPTATION VARIABLES

Adapting to a new culture is viewed as requiring a dynamic shift in personal identification (Tran, 2011). The process is a dual process including cultural and psychological change. Many international students have reported the adaption as a positive experience, though the process might be challenging. The cultural adaption is perceived as a process that enhances international student's intercultural communication competence (Lillyman and Bennett, 2014).

Based on the literature addressing both international students and Chinese immigrants, the prominent variables that influence Chinese international students' ability to adapt to life in the US include (a) cultural distance, (b) cultural shock, (c) social support, (d) stress and anxiety, (e) language barriers, and (f) classroom transition. In addition, Wilton and Constantine (2003) studied the relationships among length of stay in the US, cultural adjustment difficulties, and psychological distress

in a sample of Asian and Latin American students attending college in the US. Their findings suggested the length of stay in the US is negatively associated with acculturative stress. Both Asian and Latin American students who had resided in the US for longer periods tended to report lower levels of distress in adjusting to U.S. cultural norms. These students may also have more established social support networks than individuals who have recently immigrated into the US (Tsai et al., 2000). Wilton and Constantine (2003) also suggested there is relationship between acculturative stress and psychological health. When acculturative stress interplays with other stressors such as financial difficulties and academic pressure, this might trigger mental health problems.

Cultural distance

Redmond (2000) reported that students might experience different types of stress when encountering different cultures and identified four dimensions of culture: (a) power distance, (b) uncertainty avoidance, (c) individualism/collectivism, and (d) masculinity/femininity. The differences of the four dimensions between cultures Redmond (2000) referred to as "cultural distance."

Power distance represents the degree to which members of a culture accept that institutions and organizations have power (Redmond, 2000). Uncertainty avoidance refers to the degree to which members of a culture feel uncomfortable with ambiguity and uncertainty. Individualist cultures place higher emphasis on individual goals; collectivist cultures place higher emphasis on group goals. Redmond (2000: 152) used masculinity as a descriptor of those cultures that have "preference for achievement, heroism, assertiveness and material success". On the other hand, femininity cultures, according to Redmond (2000), emphasize the importance of relationships, caring for the weak, and the quality of life.

Redmond (2000) argued that masculinity/femininity dimensions reflect "patterns of thinking, feeling and acting" (p.152). Therefore, they play an important role in intercultural interactions. Gudykunst and Tingtoomey (1988) reported that cultural variability strongly affects social relationships. For example, they reported that members from a femininity culture might perceive someone from masculine culture as adopting an excessively assertive style of communication, even though the assertive style communication is considered a norm in the masculine culture. Redmond (2000) concluded that the greater the differences in these four dimensions, the more difficulties individual members of a culture may experience when living in another culture.

The greater the distance between the native culture and the host culture, the more difficult it may be for the students to have accurate predictions and interpretations of the behaviors in the host culture (Furnham and Bochner, 1982; Redmond and Bunyi, 1993). For Chinese international students who study in the US, the cultural distance between Chinese culture and American culture is relatively far, and therefore their acculturative stress may be high (Redmond, 2000; Yan and Berliner, 2009).

Cultural shock

The ethnographic descriptions of Chinese and American culture differ immensely in their cultural orientations. "Chinese culture has been described as emphasizing interpersonal relationships, the collective, obedience to authority, and emotional moderation and control" (Tsai et al., 2000: 304). On the other hand, the mainstream American culture is described as supporting rugged individualism, defiance of authority, and open emotional expression (Tsai et al., 2000). For Chinese international students, when encountering a culture vastly different from their own, it is probable they will experience cultural shock. Because Chinese international students are new to the host country, and their plan of staying in the country is temporary, they might experience homesickness (Tsai et al., 2000).

The cultural adaptation process can be argued to be a never ceasing process. For example, according to Tsai etmal (2000), Chinese immigrants who have stayed in the United States for more than a decade may experience a cultural identity crisis, as they are legally considered American citizens but perceived as an outsider or a foreigner in their own country (Sue and Sue, 2013). However, Chinese international students are legally considered "aliens", and they identify themselves as foreigners in the US; therefore, there is less of an identity crisis for Chinese international students. However, the process of cultural adjustment never stops for either group, because it is a constant reality that they live in the US, a foreign country whose culture is vastly different from their own. However, some students reported viewing cultural shock as a positive experience; it is then interesting to consider how they view their own identity in a foreign country while being treated as a foreigner, which has a negative meaning in the English language (Lillyman and Bennet, 2014; Pan et al., 2013).

Social support

Kashima and Loh (2006) looked at Asian international students' acculturation to Australia and found that personal ties with international, co-national, and local Australian students significantly influenced acculturation. Kashima and Loh (2006) divided international students' friendship patterns into three categories or networks. First, the mono-cultural network referred to the close friendships with other co-national international students, which comprised of the primary social network for

international students. Second, the bicultural network was a network of academics, students and advisors. The bicultural network was the international students' secondary network. Third, the multicultural network was categorized as a network connected to other internationals living in Australia. The co-national ties helped international students stay connected with their cultural heritage. The bicultural network aimed to assist international students function academically, and the multicultural network was used for entertainment and recreational purposes. Due to the short cultural distance between Australia and the US, the experiences of international students in Australia might be similar to that of Chinese international students in the US.

Kashima and Loh (2006) argued that social ties seen in the various networks play an important role in helping newcomers' psychological adjustment, or emotional wellbeing and satisfaction during the cultural transition. For example, they found that strong ties with co-nationals offer psychological support and help the newcomers with a cultural identity related to their own cultural heritage

Kosic et al. (2004) reported that Asian international students face the task of learning about interpersonal norms. Their study indicated that international students with more local and international ties seem to more easily adapt to the new culture, whereas those who have more co-national ties, but less international ties seem to have difficulties with cultural adjustment.

Individual international students may experience different levels of acculturative stress (Ye, 2006). Among all international students studying in the United States, Asian international students might need to put greater efforts into the adaptation process due to larger cultural distance (Ye, 2006). Based on the framework provided by Redmond (2000), in terms of the four dimensions of cultural distance, the United States and other western European cultures are at extremes of individualism, whereas Asian countries including Indonesia, South Korea and China show a strong collectivist orientation (Lustig and Koester, 2003). Ye (2006) argued that this indicated there are basic differences in cultural values.

Stress and anxiety

According to Yeh (2003), previous researchers have studied specific concerns about Asian immigrant youth. For example, Asian immigrant youth often had high expectations about the host country before they came to the United States. However, after they arrived in the US, their expectations were not always met and consequently they often felt disappointed (Homma-True, 1997; Uba, 1994). Furthermore, when high expectations are not met, young Asian immigrant youth may experience depression, disappointment, resentment, and cultural shock (Yeh, 2003). Those students who hold unrealistic high expectations about their competence and their lives in the

United States may suffer from a deep sense of loss accompanied with painful feelings of inferiority (Sandhu, 1995).

According to Lillyman and Bennett (2014), international students experience a mix of excitement and anxiety when they first arrive in the host country. According to Brown and Holloway (2008), moving to a new environment is often one of the most traumatic events in a person's life. For international students who move to the US, the transition is significant and they are in great need of support to smooth the transition.

International students who choose to study in the US may face various other stressors in the host country (Kim and Kim, 2010; Lillyman and Bennett, 2014). For most international students, the decision to study abroad generally involves a large personal, social, and financial investment. Therefore, the international students may feel the pressure to succeed as a result of this investment. It could be more challenging for international students who have language barriers than their American counterparts to complete an undergraduate degree (Hendrikson et al., 2011; Jung et al., 2007). The challenge and the pressure may cause anxiety for some international students.

Asian Americans are perceived as the role model ethnic minority in the mainstream American culture. Often it is assumed that Asian Americans are free from psychological problems (Sue and Sue, 2013; Yeh, 2003). However, Wilton and Constantine (2003) reported that Asian Americans tend to downplay their psychological problems due to the shame attached to seeking counseling for mental health problems. Asian Americans may present their difficulties in academic and career choices when seeking help from counselors. The real problems beneath the surface may be academic pressure and other psychological problems that they try not to speak about in their lives (Wilton and Constantine, 2003).

Findings have suggested that acculturation is related to mental health (Jung et al., 2007; Yeh, 2003). International students may experience anxieties and pressures when they study in a foreign country. When these anxieties and pressures exceed the normal level, the students may have mental health issues.

Language barrier

The English language was identified as a major problem for some international students (Church, 1982; Ying, 1996). English proficiency is significantly related to academic success and social adjustment (Flannery and Wieman, 1989). A language deficiency may cause lack of participation in the classroom on the international students' part. Limited English proficiency might be evident in international students' reading, writing, listening and speaking skills. In addition, international students may require more time for reading and writing, which may interfere with their academic performance if

an exam is set to be finished within a limited time. Also, language deficiency may cause international students to doubt their success in their programs (Lin and Yi, 1997). For Chinese male students, this may be more challenging due to their fear of disappointment when making mistakes.

Lack of English proficiency may cause international students to experience social anxiety and confusion (Redmond, 2000). The language barrier can be a factor that contributes to the social isolation of Chinese international students in the host country (Karuppan and Barari, 2011). According to Bertram et al. (2014), English proficiency is reported as one of the constant stressors during the acculturative process. Their study reported that linguistic deficiency was perceived as the major block for the Chinese international students' participation in social engagement and led them to miss social situations (Spencer-Rogers and McGovern, 2002). Chinese international students also reported feeling disconnected from their environment and surroundings due to language barriers and different life experiences (Huang, 2012).

Speaking with an accent is another factor that affects international students' ability to function in social and academic settings. Based on an accent, listeners will evaluate the speaker's competence, social status, social attractiveness, personality, and similarity to the listener (Giles, 1970). In addition, Fuertez et al. (2002) pointed out that a nonnative accent can lead to stereotyping and discrimination on the listeners' part, whereas listeners associate a standard English accent with higher social status, intelligence and education.

Classroom transition

Classroom transition has been described as the "experiences of acute frustration, confusion and anxiety experienced by students who are exposed to unfamiliar learning and teaching methods, bombarded by unexpected and disorienting cues, and subjected to ambiguous and conflicting expectations" (Griffiths et al., 2005: 275). Chinese international students might experience these frustrations transitioning to classrooms in the US due to the cultural and educational differences between China and the US (Karuppan and Barari, 2011). For example, Chinese students view their professors as authority figures in their fields (Huang, 2012). They may not feel comfortable challenging the opinions of their professors. In addition, discussion in the classroom among the students is not a familiar teaching style for Chinese students, because in the Chinese culture it is considered impolite to constantly talk about personal opinions. Furthermore, the topics in the discussions are more relevant to American culture, which might be less relevant to the Chinese students (Huang, 2012; Yan and Berliner, 2009).

Huang (2012) reported on the various aspects of classroom transition that Chinese international students experienced in the classroom environment in the US. First, Chinese international students feel uncomfortable participating in classroom discussions, asking questions in class, and having critical arguments (Durkin, 2011). Huang (2012) and Parris-Kid and Barnet (2011) argue that unfamiliarity with the learning environment may discourage the learner from participating in classroom discussions. Furthermore, many American instructors indicated frustrations in engaging Chinese international students in classroom activities. Some teaching strategies that worked well with American students seemed ineffective with Chinese international students (Gu, 2011).

Huang (2012) argued that classroom transition also involves other factors. For example, when Chinese international students take classes in the US, their familiar learning context is lost. Therefore, Chinese international students might have to spend more time and make more effort to synthesize information to resolve their cognitive conflicts than their American counterparts in order to effectively participate in classroom activities (Huang, 2012). Furthermore, the content of learning materials, especially for the social sciences, is likely to be more relevant to American culture and it might take some time for Chinese international students to adjust (Zhao and Bourne, 2011). Learning in a foreign environment involves the learners' prior knowledge about cultural taboos, social expectations, learning approaches and the subject matter. What is common sense for learners from the mainstream American culture may be novel to Chinese international students (Huang, 2012).

POSSIBLE SOLUTIONS

Chinese international students encounter challenges while studying in the US, but relevant literature also proposes possible solutions to the challenges that Chinese international students face. The recommendations include helping with language barriers, increasing social support, advocacy to improve living conditions in the US, seeking counseling services, and smoothing the classroom transition.

RECOMMENDATIONS FOR HELPING WITH LANGUAGE BARRIERS

Many Chinese international students find it difficult to communicate in English when they first arrive in the US (Brown and Holloway, 2008). English is taught as a foreign language in China and many Chinese international students do not feel comfortable speaking English in various situations. The variables that influence acculturation are often interwoven together. Social

contact with the English native speakers may help improve a student's English and ease the process of acculturation. However, limited English may cause anxiety for Chinese students when communicating with native speakers.

In order to be successful with their academic study in the US, international students need to have sufficient language proficiency to complete their programs in English. Educators play an important role in assisting international students to overcome language barriers (Lee, 2013). First, educators should acknowledge their own biases toward imperfect English. Accented English does not indicate any deficiency in English or low level of intelligence (Skow and Stephen, 1999). Lee (2013) reported that one way to increase the tolerance of accented English is to invite speakers with various accents and cultural backgrounds to give presentations in their fields. International students may think it inspirational that someone from a similar background is successful in their field (Lee, 2013). In addition, educators need to be more patient and learn about the differences in communication styles, word choice and nonverbal expressions. For example, Chinese international students may spontaneously translate from their native language to English, which may have completely different connotations in the English language. Lee described a Taiwanese graduate student's reply to her supervisor's question, "How are you feeling?" after she failed her comprehensive exam. Her reply was "I want to die!" This answer was shocking for her supervisor who believed the student had thoughts of suicidal. However, "I want to die!" is an expression of frustration in the Chinese language.

Social contact supports language proficiency and adjustment

According to Pan et al. (2013), establishing a social network in the host country can contribute to international students' adjustment to the new environment. For example, exposure to a new culture offers an opportunity to enhance intercultural communication skills and intercultural competence. In addition, Gill (2007) reported that reconstructing social networking in the host country significantly improved international students communication skills and developed their language and interpersonal skills. The experience of interacting with different educational and cultural environments helps international students function effectively both in the host and home countries (Gu et al., 2010). According to Kashima and Loh (2006), social contact with the local people would help the newcomers to adapt to the new culture.

However, social contact is not limited to social interactions with American students. According to Swagler and Ellis (2003), Taiwanese international students reported that missing family, friends, and their Taiwanese social network was a source of stress in the United States. They expressed their emotional distress resulting from constantly speaking in a foreign language in an immersed environment. However, according to their study, students who have Taiwanese friends and interaction with American students reported the most satisfaction with their studying experience in the US. According to their research, the more adjusted individuals seem to have both contacts with their Taiwanese friends and American friends (Swagler and Ellis, 2003).

Through events inside and outside the campuses, international students can get to know more people and improve their language skills and intercultural competence.

Counseling services

Offering counseling services could be one of the solutions or supports that can be offered to assist Chinese international students to smooth their cultural adjustment (Swagler and Ellis, 2003). However, there is a paradox for offering counseling services for Chinese international students. Chinese students are less likely to seek counseling treatment than their American counterparts, other than for somatic disorders (Lin and Yi, 1997). Asian Americans seem to mix mental health and physical discomfort (Sue and Sue, 2013). Furthermore, international students are reluctant to seek counseling services unless they are in a crisis (Swagler and Ellis, 2003).

When counseling individual Chinese international students, the counselors may consider various factors that may influence the therapeutic relationship. According to Leong (1986), when counseling Asian Americans, counselors should pay specific attention to client and therapist variables. For example, client variables include the clients' class background, linguistic background, and language proficiency. As for therapist variables, those could be the therapists' own cultural biases and prejudices against Asian Americans, lack of intercultural skills and training biases (Sue and Sue, 2013; Tyler et al., 1985).

Wilton and Constantine (2003) also suggested a solution to increase the chance for international students seeking counseling services. For example, the university counseling center may advocate for international students. They also suggested the university counseling center should consider hiring ethnic minority counselors to add 'face value' to gain trust from ethnical minority students.

SUGGESTIONS FOR SMOOTHING THE CLASSROOM TRANSITION

One of the stressors that interplay with acculturative

stressors is academic stress. Lowinger and colleagues (2014) recommended that colleges establish programs that help improve students' academic self-efficacy. Studies suggest that Chinese international students have confidence in their professional performance but English hinders their verbal expression of their knowledge of the subject (Lee, 2013; Swagler and Ellis, 2003). Instructors are encouraged to use a variety of assessment tools to help international students feel less linguistic stress and improve their academic self-efficacy.

Kwok and Arpan (1994) reported that the internationalization of curriculum generally takes longer than the internationalization of campuses. Therefore, international students generally are expected to be the ones to adapt to the changes. Practical strategies for Chinese international students to adapt to the host country are helpful. However, studies also suggest that forcing Chinese international students to adopt the western values and approaches is not a consistently effective solution for them (Zhou et al., 2011).

Some scholars proposed institutional reform to better serve the diverse student population. Recommendations are proposed for program planners, mentors, and faculty members to discuss international students' personal development and adaptation to the new environment. In addition, support systems can be built into a mentoring culture to openly discuss the struggles that Chinese international students are likely to be experiencing. Furthermore, a mentoring culture may also include faculty mentoring, peer mentoring, and role model mentoring. The combination of mentoring systems may help the newcomers to foresee the possible specific needs from that country (Huang, 2012). The newcomer may draw some experiences from the mentoring system and can take preventative actions to solve some of the challenges they may encounter in the future.

Huang (2012) also argued that faculty members who teach or supervise Chinese international students may offer more factual information, culturally sensitive learning cues and more time and space for international students to participate in classroom activities and discussions. This reciprocal teaching and learning process can help the faculty members and the students to adapt to each other's teaching and learning strategies (Zhou et al., 2011). In addition, the instructors may adapt easier to future international students' learning needs based on their experience with previous international students that they have had.

Advocacy

International students have limited influence over the host society due to their immigrant status and their newness to the social system of the host country (Williams and Johnson, 2011). There is ample evidence that indicates having unfavorable relations with the citizens of the host country has serious consequences on the psychological well-being of international students (Leong and Chou, 1996; Paige, 1990). Although changing the stereotype against foreign students may not be easy, counselors and international office personnel may advocate or give statistics about the economic contributions that international students give to the US economy. The perceived threat, according to Spencer-Rogers and McGovern (2002), is that citizens of the host country see international students as threat to scholarships and competitors in the job market. However, the majority of international students (77%) in the US had tuition fees paid by their family members in their home countries and the majority return to their own countries after they finish their study in the US (Spencer-Rogers and McGovern, 2002).

Financial stressors and career concerns are challenges that Chinese international students face while studying in the US (Lee, 2013). Unlike other countries, such as the United Kingdom and Australia, which give international students 20-hour work permits, the United States only authorizes international students to work on campus. This significantly reduces the employment opportunities for international students, which could make them financially vulnerable when something unexpected happens at home.

According to Lee (2013), the international office and international student body could offer guidance for international students applying for their limited financial aid programs even though the majority of financial aid programs and scholarships are only open to American students. In addition, some studies indicated that teaching assistantships are preferentially offered to domestic students due to international students' English deficiency (Kim and Kim, 2010). Lee (2013) suggested that by considering international students' eligibility for assistantships, the faculty member could promote their academic success and count on this population for their dedication and creativity when needed. This could include a 20-hour work permit per week, which could also be a way for the international students to have increased social contact with mainstream American society.

Furthermore, there are strict legal restrictions on international students doing internships in the US. International students go through a Curricular Practical Training (CPT) application, which requires complicated paperwork. If an international student does an internship for more than a year, he or she will lose the opportunity to work in the US after they graduation. Even if international students are allowed to apply for jobs in the US, most jobs are only open to US citizens or permanent residents. Furthermore, international students are only allowed to work in the US for one year. They need to apply for OPT if they intend to apply for jobs in the US. Compared with Canada, the UK and other western countries, the US has the strictest legal restrictions on international students working in the US (Lee, 2013).

Changing the overwhelmingly strict legal restrictions on international students is unlikely to happen unless some organizations in the US have political influence or international students' voices are heard. The advocacy cannot be done effectively by international students themselves due to their non-immigrant status, which puts them in a powerless and vulnerable position in the political world of the US.

FURTHER RESEARCH

The extent of cultural shock may be different for the European international students and Asian students due to different cultural and linguistic backgrounds (Smith and Khawaja, 2011). When applying the research of international students and Chinese immigrant students to the Chinese international students, caution is needed. Further research may be required to investigate Chinese international students to see whether the findings of other groups can be verified.

The literature in this paper is about Chinese international students in general. However, within this group, Chinese international students majoring in different disciplines may have individual needs. For example, the challenges of engineering students may be different from international students who major in clinical psychology or counseling (Lee, 2013). Furthermore, Chinese international students from different social and economic backgrounds may view their experiences differently in the United States and hence their challenges could also be different (Swagler and Ellis, 2003). Future research could be conducted studying the variations within the group of Chinese international students.

CONCLUSION

The article offers a comprehensive description of the challenges that Chinese international students face during their stay in the US. The literature offers support for the acculturative stress that they experience. For example, the description of cultural distance offers an explanation for the cultural shock that Chinese international students may experience when they encounter the mainstream American culture. Furthermore, the detailed description of cultural shock, stress and anxiety that Chinese international students may experience gives educators, international office personnel, and counselors working at the university counseling centers, a more clear idea of what the Chinese international students' life is like during their stay in the US.

Furthermore, discussions of social support and how social support may have a positive influence on international students can guide the people who work with Chinese international students to offer platforms for Chinese international students to establish their network and social support in the new environment. Through the platforms or events that aim to increase opportunities for Chinese international students to interact with people from various backgrounds, Chinese international students may realize the importance of establishing social support. At the same time, their intercultural competence may be significantly improved as well.

Finally, issues such as language barriers and classroom transition may offer insight on the educators' side about the reformation of curriculum to better suit the needs of Chinese international students. While helping international students improve their language proficiency, educators at the same time need to understand that native-speaker fluency can rarely be achieved. Therefore, accented and imperfect English should be acceptable for educators. At the same time, curriculum design and classroom activities should be designed to consider the needs of Chinese international students so their full potential can be reached in the new educational system.

The suggested strategies may help people in the tertiary educational setting, international office personnel and counselors working in university counseling centers to better understand the needs of Chinese international students and consequently be better prepared to help Chinese international students succeed in a new educational and cultural environment.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Evaluation of sport mental toughness and psychological wellbeing in undergraduate student athletes

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This study aims to evaluate the relationships between sport mental toughness (SMT) and psychological wellbeing (PWB) of undergraduate student athletes. Mental toughness represents the ability of a person to cope with the demands of training and competition, increased determination, focus, confidence, and maintain control under pressure. Mental toughness has been explained as the ability of an athlete to cope with the requests of practice and competition, improved determination, focus, self-confidence and keeping control under pressure. The concept of PWB has been introduced in eudaimonic part as the realization of potential through some form of struggle. The sample of the study constituted by 130 participants from two Turkish universities, included participants from a Physical Education and Sport Education program from four years of standard undergraduate study. To assess mental toughness, the Sports Mental Toughness Questionnaire (SMTQ) (Sheard et al., 2009) was administered; while to assess PWB, Ryff's PWB scale (1989a) were given to volunteer participants. To identify the internal consistency of the validated questionnaires, Cronbach's alpha score was used. The relationship between SMT and PWB was identified by conduction of Pearson Product Moment Correlations. To check for age, gender and level of the study, the hierarchical multiple linear regression analyses was used to examine the predictive capacity of mental toughness on PWB. Multiple linear regression analyses' findings revealed that sub-dimensions of SMT were moderate to strong predictors of PWB with between 40 and 66% of variance explained. Consequently, the demographic factors were not found to predict PWB. These results are consistent with the assumptions and continue to show the potential importance of SMT within the physical education and sports learning environments.

Key words: Mental toughness, psychological wellbeing, student athlete.

INTRODUCTION

Technological developments can result in individuals' pushing their limits which can cause a number of

physiological illnesses and depression since they cause inevitable changes in modern life and socio-cultural values, create competition, and bring societies' very complex work and life environments into the forefront. In such an environment, one of the most important missions of a society is to contribute to the development of its members by raising them as physiologically and mentally healthier individuals and education is the key in order to carry out this mission.

Education is one of the essential foundations required for a society's development. It is believed that education helps to raise top level individuals by bringing out their potential strengths and skills. Raising individuals physiologically, mentally, emotionally, and socially as a whole is one of the basic principles of contemporary education. The realization of education's aim in accordance with contemporary expectations is possible through not only mental but also physiological training. Physical and sports education, which aim to teach movement is an indispensable part of basic education and contributes to the aims of basic education. The primary aim of physical and sports education, which has great importance within basic education, is to help increase every learner's movement capacity to top levels by educating them through physical activities. At the same time, it aims to contribute to children's physical, mental, social, and emotional development and increase these qualities to top levels (Pate et al., 1998).

The concept of education, which enables the transfer of cultural values that have accumulated ever since the creation of society to new generations and includes substructure elements such as equipment and programs as well as teacher qualities, requires efficient harmony and good quality for the process in which an individual will stay for years so that lasting behavioural change occurs (Ball and Forzani, 2009).

The time an individual spends at university is one of the most unsteady periods of development and falls on the last phase of adolescence which is considered as both a social and biological transition period. This period in addition to complicity of adolescence is one in which many problems in relation to leaving home and family, selecting friends, joining groups, becoming a candidate for an occupation, and finding a job are observed. Students who start university in a place other than their hometown suddenly find themselves in a different academic and social environment (Özdel et al., 2002). This new stage is different compared to the past in terms of educational experiences, relationships, and social life. Students have to take responsibility and make decisions on their own in this social environment to which they have not yet become accustomed. Using their individual potential in the shortest amount of time possible, students have to adapt to this new environment in which family and friend support has suddenly been interrupted (Karahan et al., 2005).

Students who are studying as future teachers and the problems they experience is an important topic for consideration. In this sense, considering they will have a role in bringing up the next generation of individuals for the society, it becomes important that pre-service physical and sports education teachers' mental health and physiological well-being levels are determined and necessary precautions are taken to ensure they have these qualities at desired levels. Furthermore, it is important that the awareness of institutions that prepare physical and sports education teachers is increased about these phenomena. Studies have shown that student who have recently started studying in their degree programmes and are still in their first year of study experience mental health and physiological well-being related problems at different levels. Therefore, finding more about factors relating to mental health and physiological well-being has become important (van Driel et al., 2001).

In higher education, a number of contributors can anticipate that mental toughness is related to psychological well-being. While support mechanisms and learning environmental are external factors that can help transition and coping (Nelson et al., 2006), individual features also make an important contribution to this process. Mental toughness is affiliated with a more effective coping ability and optimistic assessments (Nicholls et al., 2008) and high levels of self-esteem (Clough et al., 2002). In their study Pritchard et al. (2007), informed that optimism and self-esteem in particular are positively related to effective student transitions. On the other side, being committed, having narrow personality traits and the competency to cope with concurrent changes and requests that occur during transitions are important features related to both academic achievement and mental health (Crust et al., 2014).

According to information presented so far, the goal of the present study is to investigate the relationship between mental toughness and psychological well-being levels through a sample of student athletes who are studying at the university to be physical education teachers.

METHODOLOGY

Participants

The sample of study included athletes who were training and competing in a wide variety of sports. The sample consisted of 130 athletes (mean ± *s*: age 21.25 ± 2.87 years). Participants' age ranged from 18 to 27 years. There were 50 first-year students, 48 second-year students and 32 third-year students; all students were studying in departments of physical education and sport.

Instruments

The Sport Mental Toughness Questionnaire (SMTQ) (Sheard et al.,

Table 1. Means and standard deviations, normality, Cronbach alpha scores, and bivariate correlations.

Sub-scales	M (SD)	Skew	Kurt	1	2	3	4	5	6	7	8	9
Confidence	3.01 (0.54)	-0.51	0.55	(0.72)								
Constancy	3.29 (0.51)	-0.60	0.43	0.60**	(0.65)							
Control	2,82 (0.70)	-0.45	0.89	0.46**	0.58**	(0.63)						
Purpose in life	4.47 (0.69)	-0.67	0.68	0.70**	0.64**	0.68**	(0.65)					
Pos. relations	4.78 (0.67)	-0.70	0.55	0.41**	0.51**	0.55**	0.43**	(0.77)				
Autonomy	4.10 (0.71)	-0.57	0.47	0.39**	0.46**	0.32**	0.39**	0.55**	(0.69)			
Personal Growth	4.54 (0.62)	-0.76	0.50	0.53**	0.57**	0.46**	0.51**	0.47**	0.49**	069)		
Env. mastery	4.33 (0.68)	-0.72	0.90	0.51**	0.72**	0.60**	0.66**	0.38**	0.62**	042**	(0.71)	
Self-acceptance	4.24 (0.80)	-0.60	20	0.48**	0.63**	0.72**	0.55**	0.49**	0.52**	0.58**	0.52**	(0.61)

**Statistically significant at $p < 0.01$.

2009) is a 14-item questionnaire established to ascertain athletes' mental toughness levels. Students athletes answered items on a four point Likert scale anchored from not true at all to very true and has an approximately completion time of around 4 min. Total scores for SMTQ and for three subscales can be calculated. SMTQ has three sub-dimensions: 6 items for confidence ($\alpha = 0.80$), 4 items for constancy ($\alpha = 0.74$), 4 items for control ($\alpha = 0.71$).

In this research, psychological well-being was evaluated by Ryff's Psychological Well-Being scale (1989a) on the six dimensions of psychological well-being: purpose in life, positive relations with others, autonomy, personal growth, environmental mastery and self-acceptance. The original version consists of six dimensions of 20 items each but however, the shortened version proposed by van Dierendonck (2004) was used. Totally, there were 39 items for six dimensions. The subscale length varied between six items for self-acceptance, positive relations with others, environmental mastery, and purpose in life; seven items for personal growth and eight items for autonomy. A six-point answering scale was used for all scales, ranging from 1 (totally disagree) to 6 (totally agree).

Procedure

At the beginning of the research process, the goal of the study was explained to the participants and they were made to know that they could withdraw at any time, and then they all signed an informed consent form. A demographic information sheet and the SMTQ (Sheard et al., 2009) and Ryff's Psychological Well-Being scale (1989a) were administered to the student athletes.

Data analysis

The obtained data was screened for outliers and checked for normality. Normality (Kurtosis, skewness) and descriptive statistics (mean - standard deviation) of variables was calculated before statistical data analysis. To identify the internal consistency of the validated questionnaires, Cronbach's alpha score was used. The relationship between SMT and PWB was identified by conduction of Pearson Product Moment Correlations. To evaluate for demographics (level of study, gender and age), the hierarchical multiple linear regression analyses was used to examine the predictive capacity of mental toughness on psychological wellbeing.

RESULTS

Measures of Skewness and Kurtosis found the data to

be normally distributed. Descriptive statistics are presented in Table 1. Mean values of PWB within the study were alike to data obtained by Dierendonck (2005) for young adults. SMT sub-dimensions revealed sufficient internal consistency ($\alpha = 0.78$).

Pearson bivariate correlations were evaluated to control check relationships among all components. In particular, the matrix ratio was statistically meaningful. All SMT components were positively affiliated with all PWB components. The strongest relationships consisted between control and self-acceptance ($r = 0.72$, $p < 0.01$), constancy and environmental mastery ($r = 0.72$, $p < 0.01$), confidence and purpose in life ($r = 0.70$, $p < 0.01$). All correlations are presented in Table 1.

Redundancy can be named as the reason of founded high level of correlations (Kline, 1999). The considerate to moderately-high correlations within PWB components supports the relative independence of each component. To further investigate the relationship between SMT and PWB variables, a series of multiple hierarchical linear regression analyzes were performed. In each analysis, the age, sex, and year of study were imported at step one by utilizing the enter method. In the second step, the three SMT variables were introduced. Each aspect of psychological well-being functioned as a dependent variable in the separate analysis. Overall, the results indicated that most of the variance for each psychological well-being scale was explained by one or more components of SMT.

In overall, the variance explained of each wellbeing scale ranged from 40 to 66%. Respectively, purpose in life was positively predicted by confidence ($b = 0.31$, $p < 0.01$) and control ($b = 0.36$, $p < 0.01$). Positive relations with others were positively predicted by confidence ($b = 0.34$, $p < 0.001$). Autonomy was positively predicted by constancy ($b = 0.56$, $p < 0.01$) and control ($b = 0.49$, $p < 0.01$). Personal growth was positively predicted by confidence ($b = 0.38$, $p < 0.01$) and constancy ($b = 0.27$, $p < 0.001$). Environmental mastery was positively predicted by confidence ($b = 0.46$, $p < 0.01$) and control

Table 2. Hierarchical multiple linear regression analyses.

Subscales as variable	Step 1 (Age, gender, year of study)	Step 2 (Mental toughness subscales)
Purpose in life	$\Delta R^2 = 0.05$ F(3,126) = 0.82 Age β = -0.06, Gen β = 0.02 YoS β = 0.08	$\Delta R^2 = 0.54**$ F(6,123) = 15.66** Conf β = 0.31**, Cons β = 0.07 Cont β = 0.36**
Pos. relations	$\Delta R^2 = 0.04$ F(3,126) = 1.78 Age β = -0.22, Gen β = 0.09 YoS β = 0.15	$\Delta R^2 = 0.34**$ F(6,123) = 12.24** Conf β = 0.42***, Cons β = -0.11 Cont β = -0.03
Autonomy	$\Delta R^2 = 0.02$ F(3,126) = 2.03 Age β = -0.01, Gen β = -0.19 YoS β = 0.09	$\Delta R^2 = 0.64$ F(6,123) = 18.33** Conf β = 0.14, Cons β = 0.56** Cont β = 0.49**
Personal Growth	$\Delta R^2 = 0.01$ F(3,126) = 1.10 Age β = 0.09, Gen β = 0.02 YoS β = 0.07	$\Delta R^2 = 0.41**$ F(6,123) = 7.44** Conf β = 0.38**, Cons β = 0.27*** Cont β = 0.04
Env. mastery	$\Delta R^2 = 0.04$ F(3,126) = 0.38 Age β = -0.09, Gen β = -0.02 YoS β = 0.02	$\Delta R^2 = 0.74**$ F(6,123) = 26.62** Conf β = 0.46**,Cons β = 0.31*** Cont β = 0.13
Self-acceptance	$\Delta R^2 = 0.02$ F(3,126) = 1.22 Age β = -0.07, Gen β = -0.01 YoS β = 0.26	$\Delta R^2 = 0.68$ F(6,123) = 30.47 Conf β = 0.59***, Cons β = 0.10 Cont β = 0.04

Gen: Gender, YoS: year of study, Conf: confidence, Cons: constancy, Cont: control. *Statistically significant at $p < 0.05$. **Statistically significant at $p < 0.01$. ***Statistically significant at $p < 0.001$.

(b = 0.31, $p < 0.001$) and self-acceptance was positively predicted by confidence (b = 0.59, $p < 0.001$) (Table 2).

DISCUSSION

The goal of the study was to investigate the relationship between mental toughness and psychological well-being levels through a sample of student athletes who were studying at the university to be physical education teachers.

The findings of the study support that psychological well-being was significantly PWB was meaningfully and positively related to SMT. Specifically, subscales of SMT were found to be moderate/strong predictors of PWB. However, other variables such as gender, age and year of study did not predict psychological well-being. Moreover, the findings of this study supported other studies of those which highlighted the value of mental toughness in university education (Crust et al., 2014; Stamp et al., 2015).

On the other hand, the findings of the study identify which particular components of SMT predict each of the six PWB scales, allowing more specific future interventions to improve well-being. It was revealed that constancy was the strongest predictor of both environmental mastery and purpose in life. Constancy that reflects determination, personal responsibility, and an uncompromising attitude can make sense as

managing the multiple and complex appeals of student life (Scanlon et al., 2010; Wynaden et al., 2013) will likely require deep commitment and persistence.

Confidence was the strongest predictor of both positive relations with others and self-acceptance. This result can be speculated as the university life of students' offers challenges, adversity, performance setting, and it requires long-term commitment in order to achieve one's performance and academic goals. With self-acceptance reflecting positive assessments of self and life in the past (Ryff, 1989), the relationship of confidence is consistent with the theory of self-efficacy (Bandura, 1977) and in particular reports the most coherent source of employment, past accomplishments. In addition, Clough and Strycharczyk (2012) found a high degree of confidence and optimism assumed personal perception of dignity. Intuitively, it can be ascertained that the confidence of the predictive factor of positive relationships would be with others, because of the confidence to communicate and not be limited by other people. Control subscale was not found as the strongest predict of any PWB subscale, but it was found as a moderate predictor of two PWB subscales which include, autonomy and purpose of life.

High mental toughness level is associated to respond positively to critical feedback, engage in group settings, see competence in other than motivation antecedent, create challenges as an opportunity to learn and develop priorities effectively and spend high expenditure on the

effort, effectively to cope and remain calm when under pressure in life or sport situations (Clough and Strycharczyk, 2012).

While these are apparently possible explanations of the alleged relationship, it is interesting to note that low levels of mental resistance are therefore associated with lower psychological well-being. Students with a lower mental toughness are likely to be less resistant to the demands of higher education. As others pointed out, mental toughness sports questionnaire could be an important screening tool in identifying "in-dangerous" physical education and sports department students who fail to have the necessary personal resources at university (Crust et al., 2014).

Several limitations are acknowledged. First, small part of the students invited from a total of physical education and sports departments to participate actually did and there was a higher response rate for women than men. Secondly, some other predictors or correlates should be in studies like academic achievement, hardness, optimism, etc. To address this problem, we believe that future researches should study other correlates and those should be applied on big samples.

Conclusion

The goal of the study was to inquire the relationship between mental toughness and psychological well-being levels through a sample of student athletes who were studying at the university to be physical education teachers.

It can be concluded that demographic factors including gender, year of study and age were not found to predict PWB. These results are consistent with the assumptions and continue to show the potential importance of SMT within the physical education and sports learning environments

CONFLICT OF INTERESTS

The authors have not declared any conflicts of interest.

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Full Length Research Paper

Investigating the practices of assessment methods in Amharic language writing skill context: The case of selected higher education in Ethiopia

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This study aims to investigate Ethiopian higher education Amharic language writing skills instructors' practices of Assessment Methods in writing skill context. It was also intended to look for their viewpoints about the practicality of implementing Assessment Methods in Amharic writing courses. In order to achieve the goals of this study, document analysis such as course outlines and assessment papers, 10 Ethiopian Amharic language writing skill instructors, and teaching at higher education were cross-examined. Since the study employs a mixed-method design, the researcher profited from both document analysis and interviews. The document analysis and interview data were analyzed thematically, discussed thoroughly and then interpreted. The results indicated that the majority of Ethiopian Higher Education Amharic Language writing skill courses instructors is implemented as 95% traditional assessment and 5% alternative assessment methods. Application of the assessment methods and activities was encouraged based on the curriculum. They rarely apply Alternative assessments in their writing courses. Further investigations revealed that the instructors were not fascinated by the implementations of alternative assessment in their writing courses.

Key words: Assessment methods, Amharic language curriculum, Amharic language writing skill context, writing skill courses, Amharic writing instructors, higher education.

INTRODUCTION

Amharic (ዐማርኛ) is an Afro-Asiatic Language of the Semitic group, and is related to Ge'ez (ግዕዝ) or Ethiopic. The language is widely spoken in Ethiopia, and also widely spoken Semitic language next to Arabic. As the Language is the major spoken in the country, it serves as the official working language. In public universities, it is a medium of instruction for Ethiopian languages, literature and Folklore majoring students of different disciplines like, Amharic language writing skills.

There are two forms of paradigm shifts in the writing assessment context. One is traditional assessment form and the other, alternative assessment form. For traditional form of writing assessment, indirect and direct assessments are included (Massa, 1997; Fulture and Davidson, 2007).

Indirect assessment language instructors allow the assessment of the abilities that underlie the skills, and often use items where the student selects a response,

rather than constructing their own. The usual assessments in indirect assessment method such as multiple-choice, true or false, or fill-in the blank, asses the students' ability to recognize the correct answer rather than produce it (Hamayan, 1995; Massa, 1997; Brown, 2004; Nef-Lipman, 2012; Forutan, 2014).

Direct assessment method of writing skill allows teachers to see students using writing practice in context, through tasks that require performance of writing. According to Nef-Lipman (2012) views in measuring writing ability, direct assessment is often used. Examples of direct assessment might include presentations, translations, writing summaries, and essays.

According to Oscarson (2009), Nef-Lipman (2012) and Lopes (2015), instruction methods changed in order to incorporate new principles, assessment methods needed to be adjusted accordingly. Traditional assessment methods are inadequate as a measurement for the depth and scope of education that a student receives. In writing assessment, theory alternative assessment method is suitable for measuring the student's performance.

According to Hamayan (1995), alternative assessments are procedures and techniques in the context of instruction, and can be easily incorporated into the daily activities of classroom. In this case, alternative assessments are not remotely similar to the former, traditional state assessments, but used to measure teacher success, evaluation, and retention. Instructors now find themselves in the position of designing alternative assessments that measure writing. This is so that, students are better prepared for common core assessments (Oscarson, 2009; Wubshet and Menuta, 2015). This task is further complicated for Amharic language instructors who are instructed to uphold the entire curriculum based assessment standards.

In the curriculum of Amharic Language Writing Courses in Higher Education, they restructure their curriculum and assessments to meet current demands, and state traditional and alternative assessment measures (Continuous assessment). A paradigm shift has occurred with assessment expectations for Amharic language students at Higher Education level (Tamjid and Birjandi, 2012; Wubshet and Menuta, 2015).

In the writing skill courses, practitioners are faced with the challenge of meeting the needs of all students as well as the demands of state performance evaluations. In an effort to address this quest, educators must research best practices in the areas of language assessment, and must create a perceived value to students. According to Nef-Lipman (2012), writing requires appropriate assessment choices based on the curriculum and instruction. The assessment methods also should emphasize on the writing ability.

Amharic language instructors became an integral component of assessment methods as they prepared students to meet the Writing assessment. Forutan (2014), Wubshet and Menuta (2015) and Lopes (2015) completed a study comparing the assessments practiced by English as a foreign language (EFL) teachers in their classrooms and assessment methods to what will be required with the curriculum state standards. They found that almost all EFL teachers practiced traditional assessment methods in their English classrooms. Conversely, assessments for the common core will employ questions that require fixed response such as multiple choice, matching, and true or false. Test-takers will need to simply choose a possible response to the given questions.

Using traditional, summative assessment in the language writing assessment is no longer sufficient. Fulture and Davidson (2007) and Popham (2003) explained that traditional assessment, which typically required students to recall and process contextual data, had to be modified to include assessments with closed answer tasks. Tamjid and Birjandi (2012) supposed that teachers needed to move away from traditional, one-answer assessments toward performance-based assessments in which the students' personal accountability was raised. All these research groups posited that best practices included designing some form of alternative assessment in the Language Writing context.

According to Aksu (2008), alternative assessment techniques have major advantages over traditional assessment techniques. Nevertheless, some language education research studies reveal that teachers do not prefer to use these techniques much. Some studies report that Language teachers use alternative techniques rarely because they don't have sufficient knowledge about these techniques. The reason for teachers' being more apt to traditional assessment methods might be related to their lack of confidence in preparing, applying, and grading processes of alternative assessment techniques (Forutan, 2014).

Assessment and evaluation are important parts of writing process. Whether a curriculum creates the desired effect or not on students' knowledge, skills, and attitudes determined by means of assessment and evaluation. In the implementation of Amharic writing, the curriculum and syllabus state standards, Amharic language instructors will need to assess their students in a more communicative way, and detach from traditional assessment methods. Students must also adapt to alternative ways of being assessed. Instead of being grammar-centered, teachers will need to design effective assessments with a communicative focus while continuing to cover essential grammatical concepts and typical vocabulary. Possible assessment types that would facilitate this change include dynamic assessment (Popham, 2003; Beaten et al., 2008; Oscarson, 2009), task-based assessment, and formative assessment using peer- and self-evaluations (Fulture and Davidson, 2007; Tamjid and Birjandi, 2012; Forutan, 2014).

To decide what methods to use in writing assessment,

Table 1. Higher education writing syllabus assessment recommendations.

Writing courses	Traditional assessment (%)	Alternative assessment (%)
Basic writing skill (ELAm 1023)	60	40
Advanced writing skill (ELAm 1024)	55	45
Technical writing (ELAm 1031)	65	35
Writing for media (ELAm 1032)	70	30

it is important to clarify what kind of writing case or level trying to assess. While there are numerous methods to assess language writing, what you want to measure will determine how you assess students (Brown, 2004; Hyland, 2009). For example, the assessment about the ability to use certain Essay quality in a paragraph, or the comprehension of written text in an Amharic language, or progress toward the course goals?

In the Ethiopian Higher Education, the Modular curriculum encourages the application of both traditional and alternative assessment techniques. Both assessment methods are assessed by calculating the average result of assessment methods.

Table 1 describes the assessment methods that encourages modular curriculum of Amharic Language in Higher Education in Ethiopia. The assessment trends recommended to apply in writing courses is 55 to 70 in traditional assessment, and 30 to 45 in alternative assessment.

As Brown (2004) and Ramazanpour et al. (2016) describe, language includes four skills and one of the most important skills that is needed to assess is writing. Writing is a process through which a writer tries to communicate ideas, and thoughts with the audience or reader. Nevertheless, the researcher observe from his long years of teaching in higher Education that Writing skill teachers usually implement the traditional assessment techniques. Amharic instructors prefer the traditional assessment methods because of its simplicity and time saved. So, there is need to investigate Amharic instructors implementation of assessment methods in writing courses. Based on the assumptions of Ethiopian Higher Education Curriculum, this study stated the following questions:

(1) Which assessment methods and activities do Amharic instructors employ in writing courses?
(2) Do Amharic instructors practiced the assessment methods of writing assessment based on the curriculum?

The main objective of this study was to investigate Amharic teachers which assessment methods employ in their writing courses in Higher Education in Ethiopia. Specifically, the objectives of the study are to:

(1) Identify the dominant implemented assessment methods and activities used in writing context.

(2) Investigate the reason(s) teachers claim for using or not using all of assessment methods.

METHODOLOGY

This study is a qualitative study with a survey design, since a survey is conducted on the sample in order to have an overall judgment about the whole participants. Some research questions were answered by using qualitative research techniques.

The study aims to investigate the extent to which Amharic language instructors implement assessment method in their writing courses. The participants of this study were 10 Ethiopian Higher Education Amharic Language Instructors. The participants were selected who teach writing courses.

Based on this, their educational qualification consists of 6 instructors who teach Amharic (TeAm), basic writing skill, technical writing and advanced writing skill, 2 instructors were from Applied Linguistics teaching Amharic (ALTA), technical writing, basic writing skill and Advanced writing skill, and 2 instructors were from Media and communication who teach technical writing and writing for media in different programs and academic years. All participant instructors were post graduate degree holders.

The study benefited from a kind of purposive sampling, since the researcher aimed to collect data from instructors who had academic status to provide relevant and required information. Based on this, the researcher employed a qualitative research design that comprised of document analysis and key informant interview. Document analysis is also valuable in an empirical study of this kind because it provides a practicing assessment method in context. The document analysis in this study which is the assessment methods of higher education Amharic language instructors, was collected, analyzed and evaluated.

This type of investigation can provide significant data that can be beneficial to identify the assessment methods that is used by the instructors. During the data collection, a semi-structured interview was employed. It consists of 5 questions, which invited the participants to express their practices toward assessment methods in the writing courses, the barriers to the application of these assessment methods, and its implications.

The data for this study was collected during the 2016 (2008 E.C) academic year. The required qualitative data was elicited through the document analysis and interview, which the researcher observed was course outlines, and assessment activities based on the principles of writing curriculums and syllabuses, and were asked to participate in face-to-face in-depth interviews.

In order to interview the participants, the researcher asked them to arrange certain time in advance. The participants were informed of the purpose of the research, and their consent was obtained. During the interview, the participants were asked the questions that were already prepared based on the objectives of the study. Since the interviews were semi-structured, and the questions were open-ended, the participants were free to elaborate on the issues as they thought necessary.

Data analysis involves more than providing an explanation of the

Table 2. Document analysis result.

Assessment methods based on the incorporated in the writing curriculum and syllabus		Writing skill courses				AP (%)
		BW (%)	AW (%)	TW (%)	WM (%)	
Traditional assessment methods (through homework, class work, quizzes, mid and final exams, oral presentation and discussion)	Multiple choice	20	20	10	15	95
	Matching	15	10	15	12	
	True or false	20	25	15	8	
	Fill in the gap	8	10	15	0	
	Essays	25	20	25	25	
	Oral tests	0	10	10	10	
	short answer	12	5	10	10	
Alternative assessment (project work, homework, class work)	Self	0	0	0	0	5
	Peer	0	0	0	0	
	Portfolio	0	0	0	10	
	Journal writing	0	0	0	10	

Keys: BW=basic writing, AW=advanced writing, TW=technical writing, WM=writing for media and AP= Average practice.

data that is collected from documents and interview. Qualitative data needs to be organized, so that related information can be selected and separated from information that is not directly connected to the study. In order to produce the most effective results, the researcher should have the necessary skills in order to be able to condense, reorganize and collate related information from the data collected in the study.

The field notes of each interview session were semi-structured, and the measures were taken to ensure that all the data were collected during the interview. In addition, all key informant interviews were semi-structured information. After that, the transcripts were reread several times, and selected the important information only. Data was organized into different categories based on writing assessment types listed in the writing curriculum, and syllabuses in order to shade light on the findings of the study.

The collected data in this study was generated from analysis of the assessment methods of writing curriculum and syllabus documents, and key informant interview are presented. The procedures for conducting key informant interview and text analysis are presented. First the researcher prepared two sets of checklists. One set of the checklist contained the criteria to determine assessment methods were incorporated in the instructors course outlines and test or assignment papers, and the other set determines the percentage distribution of the instructors' in the whole semester assessment methods against practiced activities.

The ultimate goal of the document analysis was to show which assessment methods was incorporated in the writing courses, and to find out the assessment methods frequently used in the writing courses in Higher Education.

DATA ANALYSIS

The data were collected from documents and assessment papers, and interview of instructors understudy conducted different assessment activities but the study focused only on assessment methods. The following (Table 2) document analysis shows the composition of each of the assessment methods that were incorporated in the writing courses.

As seen in Table 2, traditional assessment methods such as multiple choice, matching, true and false, fill in

the gap and short answer were more (95%) practiced in all of the writing courses, except in the course "Writing for Media", in which the assessment methods used in writing courses was 100% of traditional assessment questions, the only 20% of Alternative assessment types that were designed to apply in all writing courses was used in one course.

Similarly, majority of the assessment practiced fragmented bits of information (not contextualized information) as the recommendations of their assessment methods in the curriculum and syllabus. These were traditional assessment questions in which students were expected to respond by remembering information they learned, and choosing response items from context. Therefore, Table 2 clearly depict that memorization or rote learning of isolated bits of information were required, and encouraged in the assessment methods of the courses.

In Table 2, alternative assessment methods only incorporated (practiced) 5% from the recommendation to apply in writing curriculum (37.5%). Based on the writing curriculum on self and peer, portfolio assessment methods are encouraged to employ, but not practiced in all courses. As a result, it is not possible to say alternative assessment encourages the improvement of writing in progress.

The second data that gathered information on the practiced assessment methods by writing instructors in writing courses, shows participant instructors' response on assessment methods was almost similar. Among the participants, some practiced traditional assessment is based on its easy preparation and suitability for correction. These instructors mentioned choosing objective type questions as their assessment method.

In addition to this, the participant instructors mentioned their practices of assessment methods that are influenced by the type of writing skill activities they assess.

Some informants agreed with the preference of short answer and multiple choice items when assessing Basic writing skill and Writing for media courses. Nonetheless, they cannot use these if they want to assess the students' advanced writing skills. Similarly, other informant instructors mentioned that they usually prefer giving essay writing as an assignment to their students.

The other issue the instructors raised as a factor that influenced on their practice of assessment type is time. All participants mentioned that they prefer objective item assessment methods because they are not time consuming to give correction. Therefore, it is possible to conclude that instructors decide their assessment types based on its convenience for management and correction. They prefer traditional assessment methods since they are easy to administer, easy to correct, and not time consuming. Generally, the objective type of assessments reveals many traces of traditional assessment.

Most of the Amharic Language writing courses instructors given the other reasons for their reliance on the traditional assessment is that it is best for average and particularly weaker students, and it is always the same format with national examination. So, students prefer the traditional assessment methods over other types of assessments. As wubshet and Menuta (2015) opine traditional assessments have many disadvantages for both instructors and learners. One of which is that it does not help for their cognitive development, that is, critical thinking.

In the writing courses, assessment methods and activities that are used by Amharic instructors include, multiple choices, matching, true-false, essays, short answers and fill in the blank. On the other hand, the alternative assessments portfolio and journal are confirmed in one course only. Instructors that used traditional assessment depend on examination wash back, and their students are aware before the national examination. This is because the Ethiopian national examinations do have same format. In Ethiopian Higher Education, writing courses assessment methods depend on traditional assessment.

The main reasons for the practices of traditional assessment method in writing courses were behind the assessment goals (that is, easy to administer and correct, and not time consuming). These practices were also reasons that made Amharic instructors reluctant to try out alternative assessment activities in their writing courses. Therefore, Amharic instructors are not interested in alternative assessment methods, and activities because the approach is different from that practiced before and during by learners.

DISCUSSION

Since the modularization curriculum was designed to apply individual learning, cooperative learning, learner-centered, and the higher education Amharic writing courses instructors did not involve their students in the assessment practices.

Most instructors sometime made their students work with their classmates. On the other hand, Amharic writing courses instructors do not use alternative assessment method as it leads learners to involve in learning context, except in one course that is, writing for media and some different cases.

Writing curriculum and syllabuses were designed, and encouraged continuous assessment. They were to develop learners' internal motivation, and to involve in the learning process. This means assessment is practiced for the improvement of students in learning progress. However, in the Ethiopian Higher Education, writing assessment practices is quite different. Since the assessment methods employed in the writing courses are practiced to grading students, not to involve in the learning process, and to assess their learning progress.

Although assessments should encourage the improvement of writing skill in progress, the type of assessment that employed Amharic writing instructors were not for students learning improvement in progress, it was for grading students only. They were not frequent in different assessment methods and activities, and they were in the position of traditional method. The only evidence of alternative assessment was the portfolio, and writing journal in which students were asked to document their activities prepared during the whole semester.

The method of assessment mainly used by the Amharic writing instructors were customary ones, these include multiple choice, matching, essays, and true or false. They were reluctant to include alternative assessment in their practices due to different reasons, like, time consuming and easy to administer and correction. Amharic instructors assumed students are not interested to assess alternative assessment, as its format is completely different from the national examination, and their experiences.

CONCLUSION AND RECOMMENDATIONS

The findings of this research paper draw recommendations as follows:

(1) Training on the practical implementation of assessment methods and activities should be given to Amharic Writing instructors. This will help to change their attitude towards various assessment methods implementation.
(2) Alternative assessment method is new for most Amharic writing skill instructors, it should get support in form of supervision, and should be given chances to reflect their confusion regarding assessment.
(3) Higher education assessment professionals and/or departments should include all assessment methods, and activities as the assessment packages of their instructors,

and following-up its implementation.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Full Length Research Paper

Clusters and factors associated with complementary basic education in Tanzania mainland

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Complimentary Basic Education in Tanzania (COBET) is a community-based programme initiated in 1999 to provide formal education system opportunity to over aged children or children above school age. The COBET program was analyzed using secondary data collected from 21 regions from 2008 to 2012. Cluster analysis was applied to classify the 21 regions in terms of enrolments by cohort, dropouts, gender, and regional per capital Gross Domestic Product (GDP). The cluster analysis classified 21 regions into four (4) distinct clusters. The first cluster constituted nine regions; second cluster had four regions; the third had seven regions and fourth cluster had only one region. There are variations between those clusters with cluster four (Dar es Salaam region), with minimum dropout and cluster two (Kilimanjaro, Mbeya, Arusha and Iringa regions) with minimum enrolment among all clusters. The study concluded that the number of enrolment by cohort, dropout, gender, regional per capital GDP, and time in years can be used to classify regions into four distinct clusters. However, among the factors associated with the number of enrolment and dropout in the COBET centre; time in years, cohort (age) and clusters were statistically significant at 0.05 level of significance. This study recommends that new plans should be initiated based on these classifications in order to make this programme sustainable and set the new tracking system for follow up of COBET students after completing their studies.

Key words: Cluster analysis, poisson regression, and complimentary basic education (COBET).

INTRODUCTION

The Sustainable Development Goals (SDGs) emphasize estimates using national aggregates as well as variations across different population defined by group and individual characteristics aggregates. According to the fundamental policy, non-formal education is generalized as out of school education, distinguished from formal education which is obtained in schools. However, either type may include, at certain stages, some aspects of the other.However, due to the existence of over aged children who cannot be enrolled in formal primary school, Complimentary Basic Education was established.

According to UNICEF (2006), complementary basic education in Tanzania (COBET) or its Kiswahili equivalent MEMKWA) was a program initiated in 1999 to

provide opportunity for the acquisition of basic education to out of school children aged between 8 to 18years. The research of Johnson et al. (2005) show that, this program was initiated with a special focus on girls, orphans and vulnerable children following a specialized three-year course of study.

In Tanzania as it's in most Sub-Saharan African countries, priority in education is favourable to male children compared to female. UNICEF (2015) report revealed that female children continue to have severe disadvantage of being excluded in education systems despite recent year's positive progress. According to Segumba (2015), dropout is also highest to female compared to male children. The UNICEF report of (2006) defined Orphans and Vulnerable Children (OVC) as those children at risk of missing school, from households with poor food security, suffering from anxiety and depression, and who is at higher risk of exposure to human immunodeficiency virus infection and acquired immune deficiency syndrome (HIV/AIDS).

According to Segumba (2015), there were increased number of out of school children caused by dropout due to sickness, pregnancy, lack of food in the household, forced labour, fear of teachers, excessive corporal punishment, overcrowded classrooms, ineffective teaching, persistence poor performance, long distance from school, lack of food provision in school and poor administration.These lead the demand side for COBET tobecome higher than the availability of centers, which are known to suffer from limited resources and as a result most of them are closed. On the other hand, dropping out of school has emerged as a major threat to achieving Education for All (EFA) goals. This is because it threatens the very fabric of education in terms of inputs/outputs of its structure, organization and provision.

That why COBET assessment was vital. Based on the work of Ngodu (2010) dropout rate was highest in Standard/Grade III-IV in the year 2008/9. An average trend of drop out increased from 3.4% in 2005/6 to 3.7% in year 2008/09. Most of the studies conducted in COBET were focused in piloted districts, and were applied using qualitative techniques and selected small sample with no statistical justification examples Levira (2002) and Michael (2008), therefore this study employs quantitative methods. Based on the UNICEF report (2015) there is relationship between education and regions example in sub-Saharan Africa there is lowest gender parity proportion compared to all other regions.

According to Tanzania development report (2014), Kilimanjaro, Arusha and Dar es Salaam regions are more developed compared to all other regions.Likewise according to the Tanzania Development Report (2014) and UNICEF report (2011) dropout and enrolment varies regionally.

This therefore, calls for this study to assess the number of students enrolled across the regions by triangulating COBET data (that is, dropout, age, year, gender and enrollment) and regional per capital Gross Domestic Product (GDP).The study also identifies the factors associated with COBET enrollment and dropout so that policy makers can be aware and hence take necessary measures to reduce dropout and increase enrolment.

Research objectives

The main objective of this study was to triangulating Tanzania regions based on the number of COBET enrolment by cohort or age, dropout, gender, year, and regional per capital GDP. Moreover, the study examined factors associated with the number of enrolment and dropout in the COBET centers from secondary data collected from Ministry of Education and Vocation Training (MoEVT) and regional per capital GDP collected from National Bureau of Statistics (NBS).

MATERIALS AND METHODS

Given the diversity of the student populations' needs, as well as teachers' availability, a country-wide evaluation was performed to classify regions based on total enrolment by cohort or age, dropout, year, gender and regional per capital GDP from 2008 to 2012. Cluster analysis was used to classify regions based on similar characteristics. The clusters formed were then analyzed to identify the variation between them and factors associated with enrolment and dropout were then performed.

Summary statistics

Table 1 reveals that both enrollment and dropout for both male and female were declining with time being highest in the year 2008 and lowest in 2012. Although according to Johson et al. (2005). COBET were introduced to favour girls compared to boys the results shows that in all years male (boys) enrollment were higher compared to girls.

Cluster analysis

The main objective of conducting cluster analysis is to discover natural groupings of the items or variables. Hierarchical cluster analysis is the major statistical method for finding relatively homogeneous clusters of cases based on measured characteristics. It starts with each case as a separate cluster, i.e. there are as many clusters as cases, and then it combines the clusters sequentially by reducing the number of clusters at each step until only one cluster is left.

According to Antonenko et al. (2012), cluster analysis is an important technique used for examining data in educational research. The prepared by Johnson and Wichern (1992) shows that the data are grouped on the basis of similarities. In its most general

Table 1. Complimentary basic education enrollment and dropout in relation to gender.

Variable		Years				
		2008	**2009**	**2010**	**2011**	**2012**
Enrollment	Male	61.854	46.729	39.251	44.339	41.241
	Female	50.735	35.637	33.118	37.621	35.626
Dropout	Male	17.637	9.441	5.852	4837	4.608
	Female	13.574	7.292	5.303	4.184	4.247

form, a growing interest in applying data mining to evaluate educational systems makes educational data mining a rising and promising research field this is according to finding done by Romero and Ventura (2007).

Cluster analysis and k-means analysis can be used as data mining techniques. The area of application can be education, different from the usual data mining studies. The research conducted by Erdoğan and Timor (2005) which illuminated on clusteranalysis reveals that use of this technique in education may provide us with more varied and significant findings, and may lead to the increase in the quality of education.

For this study, cluster analysis was used to classify regions with similar characteristics in terms of COBET enrolment by cohort, year, dropout, and per capital regional GDP. Therefore, the clusters formed were further analyzed to determine the variation between clusters as well as if a cluster is one among determinant of COBET dropout and enrolment.

Poisson regression model

In Basic Education Research, one often encounters situations where the outcome variable is numeric, but in the form of counts. The Poisson regression models are often used to model count data. The book prepared by Kutner et al. (2005) shows, Poisson regression models are appropriate for count data because they use probability distributions for the dispersion of the dependent variable scores around the expected value for dependent variables which take on only nonnegative integer values.

Also, Daniel (2008) supports Kutner et al. (2005) idea that, Poisson varieties can take any non-negative integer value. The Poisson-regression model is a nonlinear model for the expected response whereby the expected response is a count. The Poisson distribution is characterized by a parameter λ whereby the probability that variable Y equal to variety y is given by;

$$P(Y = y) = \frac{e^{-\lambda}\lambda^y}{y!} \quad y = 0,1,2\ldots\text{where } \lambda = E(Y).$$

(1)

The Poisson mean in GLMs is commonly modelled using a log-link, $\log(\lambda) = \alpha + \beta x$. For this model, the mean satisfies the exponential relationship:

$$\lambda = \exp(\alpha + \beta x) = \exp(\alpha)\exp(\beta)^x.$$

In this study, robust standard deviation had being used as being recommended by Cameron and Trivedi (2009).

FINDINGS AND DISCUSSION

The main attempt of this study was to classify regions based on common characteristics. The hierarchical cluster analysis was performed, by using ward's method to partition the data points into disjoint groups. This implies that, data points belonging to same cluster are similar while data points belonging to different clusters are dissimilar.

According to Dymnicki (2011), ward's method is one of the clustering methods which use centroids to represent clusters by optimizing the squared error function. In this analysis, dendrogram is presented to visualize the clusters formed based on regional per capital GDP, enrolment and dropout rate at regional level.

Figure 1 illustrates four distinct clusters formed. The distance represents variation between clusters. At first, cluster 1 and 2 were merged at approximately Euclidian distance of 4 units then the two clusters, (clusters 1 and 2) merged with cluster 3 at approximately Euclidian distance of 8 units and lastly clusters 1, 2 and 3 merged with cluster 4 at approximately Euclidian distance of 25 units. Thus, there was a great variation between the first threeclusters (clusters 1, 2, and 3) in comparison with cluster4 (Dar es Salaam region). There was a difference of 17 units when the first three clusters werejoined with the fourth while Euclidian distance which merged together the first three clusters (1, 2, and 3) was 8 units.

The distribution of 21 regions was categorized into four clusters (Figures 1 and 2). The first largest cluster consists of 9 regions, namely Manyara, Mara, Lindi, Mtwara, Ruvuma, Morogoro, Rukwa, Tanga and Mwanza. The second cluster consists of 4 regions, namely Kilimanjaro, Mbeya, Arusha, and Iringa. The third cluster which was the second largest consists of 7 regions namely Dodoma, Singida, Kagera, Shinyanga, Kigoma, Pwani and Tabora. The last cluster which was the smallest consists of only Dar es Salaam region.
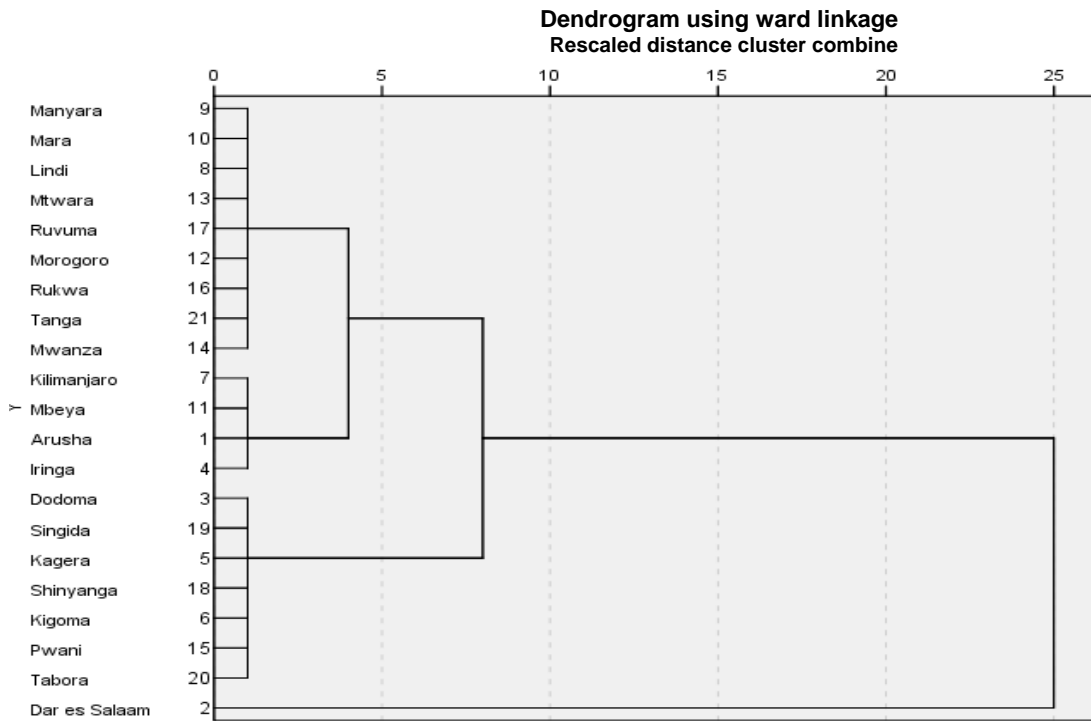
Figure 1. Ward's Linkage Dendrogram showing four clusters of regions.
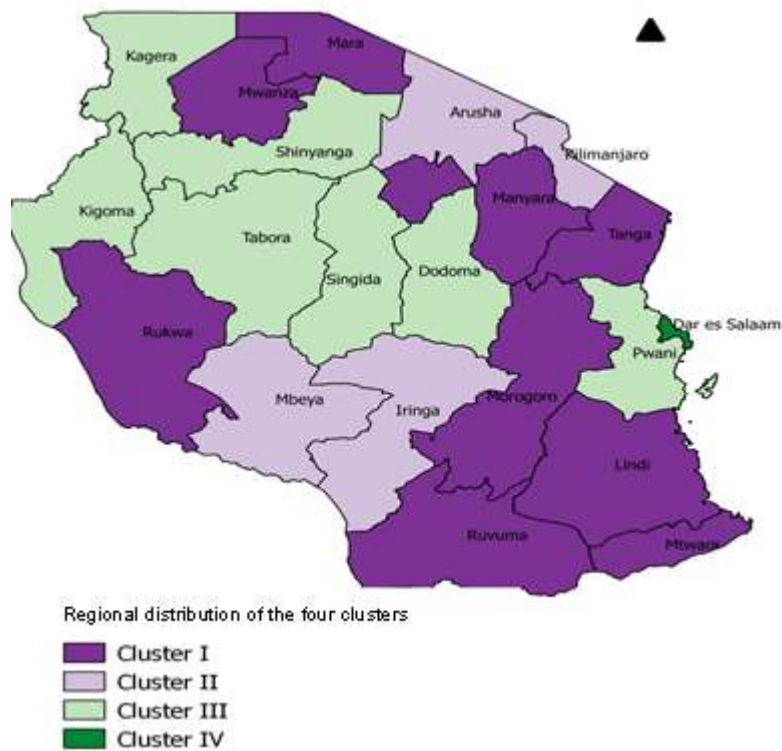
Figure 2. Map showing distribution of four clusters of regions.
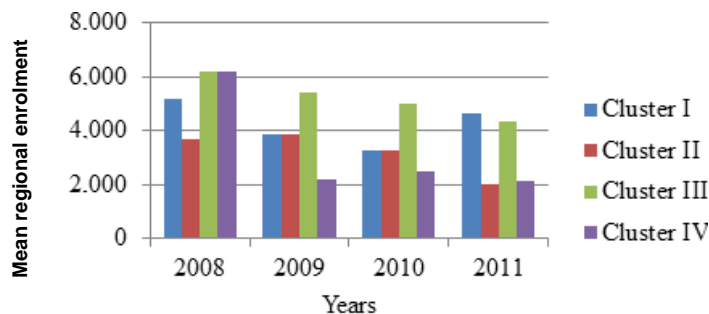
Figure 3. Mean enrolment for the four clusters.
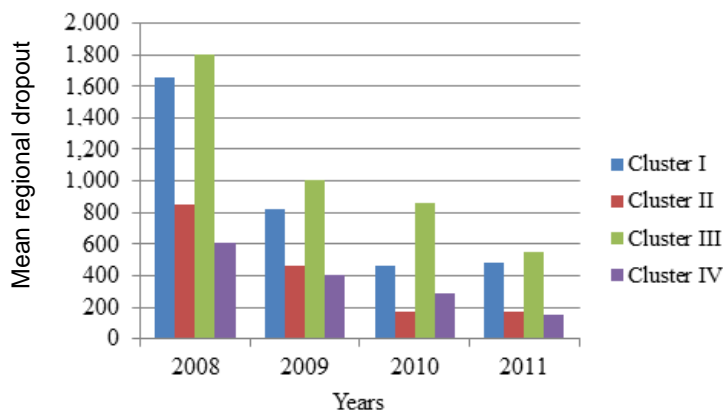
Figure 4. Mean regional dropout for the four clusters.

These classifications put Dar es Salaam region in its own cluster. This is because Dar es Salaam is the region leading in per capital regional GDP and highest literacy rate. Also the first, second, and third clusters show that there is close relationship between regions belonging to the same cluster in terms of regional per capital GDP, literacy rate, females and males literacy gap, and urbanization as also being supported by NBS (2011) Tanzania mainland report. This classification results were also supported by Ministry of Education and Vocational Training report (MoEVT) tests which showed Dar es Salaam to be different in terms of illiteracy rate, female male literacy gap and poverty levels when compared to other regions.

Within–and between-group characteristics

Through Ward's method, the distances between clusters were examined. According to Loureiro, Torgoand Soares (2004) work, cluster analysis is also known as a method

for outlier detection, where all the variables from the original data set are used for the description. Clusters summary statistics which shows variations between them are presented in Figure 3 and Figure 4.

Based on the clustering features, the smallest cluster which consists of Dar es Salaam is referred to as an outlier. In explaining the characteristics features related to this outlier, some factors were suggested by UNICEF (2006). These factors include per capital income (deepening poverty), weather condition, food insecurity, migration, lack of enough education facilities such as books, facilitators, classrooms and desks as well as willingness of the guardians to take their children to the Complimentary Basic Education centers before or even after joining the centers. Moreover, urbanization was also suggested as the cause of an outlier by United Republic of Tanzania Vice President's report (2005).

Figure 3 shows that enrolment for clusters 1 and 2 declined from 2008 to 2010 whereas for the year 2011 moved upward. Cluster 3 enrolments were decliningin all years. Unclear pattern was observed in cluster 4. Figure

Table 2. Parameter estimates and robust standard error of multivariate Poisson model for enrolment.

Variable		Parameter estimate	Robust standard error	P-Value
Gender	Male*	-	-	-
	Female	-0.71688	0.50084	0.152
Clusters	1*	-	-	-
	2	-0.6682	0.1291091	<0.0001
	3	0.37978	0.1011596	<0.0001
	4	-1.2618	0.511284	0.014
Cohort	-	0.0004084	0.0000218	<0.0001
GDP	-	1.33E-06	4.43E-07	0.003
Years	-	-0.163968	0.0367666	<0.0001
_cons	-	335.7398	73.65454	<0.0001

*Indicates reference category.

4 reveals that the dropout rate was declining over years for all four clusters from one year to another.

Multivariate Poisson regression model for enrolment

The preliminary analysis was done to check the relationship between each predictor with the response. All covariates were significant at 5% level $(p < 0.05)$. Therefore all covariates were included in multivariate analysis. Table 1 presents the parameter estimates together with standard error of the final model.

The result shows that clusters, cohort, regional per capital GDP and time in years were significant predictors of enrollment (p<0.05) whereas gender was not (p>0.05). The mean number of COBET enrolment varies from one cluster to another. Controlling the other covariates in the model, the mean number of enrolment for cluster 3 (0.3798) was highercompared to cluster 1. But the mean number of enrolment for cluster 2 (-0.6682) and cluster 4 (-1.2618) were lower than that of cluster 1.

The other significant predictors for the mean number of enrolment were cohort. The model shows that the mean number of enrolment increases with increase in cohort. The result also shows that COBET enrollment increases with increase in regional per Capital GDP. In case of time in years, parameter estimate was -0.164, hence mean COBET enrollment decreases with increase in years. However gender was not statistically significant (p>0.05) the coefficient (β) for females is -0.7169 (negative), and the male students group was taken as control group. This

implies that the mean enrolment for males was higher compared to that of females (Table 2).

Multivariate Poisson regression model for dropout

The preliminary univariate analysis was also done to check out the relationship between each predictor with the response. All covariates were significant at 5% level $(p < 0.05)$. All covariates were included in Multivariate analysis. In addition, interactions between gender and cluster and between year and gender were associated to mean number of dropouts. However, some interaction effect between cluster and year $p \geq 0.05$ for individual clusters, were also included in the model because the overall effect was significant and the model converged.

Table 3 presents the parameter estimates together with robust standard error of the final model. The result shows that the mean number of dropouts varies from one cluster to another. Controlling the other covariates in the model, the mean number of dropout for cluster 2(-0.5014), cluster 4 (-1.4856) and were lower as compared to cluster 1, whereas that of cluster 3 (0.2439) were higher compared to cluster 1. The effect of cluster on mean number of dropout depends also on gender. The other significant predictors for mean number of dropout were cohort and years.

The model shows that the mean number of dropout decreases with increase in years while it increases with cohort. However gender was not significantly associated with mean drop out, the coefficient (β) for femaleswere-51.58 (negative) and since males were taken as a control

Table 3. Parameter estimates and standard error of multivariate Poisson model for dropout.

Variable		Parameter estimate	Robust standard error	P-value
Gender	Male*	-	-	-
	Female	-51.5802	154.7265	0.739
	1*			
Clusters	2	-0.5013926	0.175406	0.004
	3	0.2438957	0.1896583	0.198
	4	-1.485565	0.733225	0.043
Male and Cluster 1*	-	-		
Female and Cluster 2	-	-0.4799697	0.1930813	0.013
Female and Cluster 3	-	0.0735148	0.1856015	0.692
Female and Cluster 4	-	-0.2984889	0.3732503	0.424
Cohort	-	0.0004294	0.0000397	<0.0001
GDP	-	9.20E-07	6.88E-07	0.181
Years	-	-0.5348705	0.0727583	<0.0001
Male and Years	-	-0.4653697	0.0724126	<0.0001
Female and Years	-	-0.4397222	0.0853475	<0.0001
_cons	-	939.2599	145.17	<0.0001

*Indicates reference category.

group, this implies that the mean dropout for males is higher compared to that of females. However dropouts for both males and females decrease with increase in years. The results also reveals that mean dropout was not related with regional per capital GDP (p>0.05)

Conclusions

On the basis of the research findings, the following conclusions have been made; that the 21 regions of Tanzania Main land can be grouped into four dissimilar clusters of regions. There are variations between those clusters with cluster four (Dar es Salaam region), having minimum dropout and enrollment compared to all others. Also, this study concluded that, based on the result of Poisson regression model the significant predictors for enrolment and dropout were the same except regional per capital GDP which was significant predictor for enrolment but not dropout. The significant predictors were time in year, cohort (age) and clusters.

RECOMMENDATIONS

This study found out that there are variations between clusters identified. Therefore evaluation for the program as its more than 15 years since its establishment may be vital, in order to identify if objectives of its establishment have been attained. More researches should be done on how COBET can be sustainable programme as there is still dropout in formal school since availability of these schools will make it possible for those dropouts to have another chance for schooling.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Expectation returns and households' decision in the schooling of their children in Khyber Pakhtunkhwa Pakistan

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This study aims to study households' expectations for their children's academic performance in Khyber Pakhtunkhwa, Pakistan. Education has a significant role in increasing the productivity and income level of an individual in a society. Household education, income, distance from school, gender discrimination within household and cost of education can affect parents' expectations of their children. The present study aims to understand why households in Khyber Pakhtunkhwa, Pakistan do not send their children to school, when free and compulsory public schools are available. A two stage Propensity Score Matching approach was applied in the study. Data were estimated through two stages Propensity Score Method. The first stage consists of probability model, used to estimate the propensity score of the characteristics of household. In the second stage, each household group was matched to predict households with similar propensity score values. Literacy rate had a negative effect on the completion of school for household members under 20 years. This means that most school graduates are unable to even read and understand. This is due to dynamic causes, like untrained teachers, lack of facilities, old syllabus, and poor quality education and socio-economic background of the household. But the main delinquency is the failure of educational policies attributed to inadequate economic structure and political instability since the existence of Pakistan. Pakistan government and policy makers need to take initiatives to improve the socio-economic condition of the individuals in the province, and also to give awareness about the importance of education in the region. Further investigation is needed to know the effect of other heterogeneous treatment.

Key words: School completion, propensity score matching, Khyber Pakhtunkhwa.

INTRODUCTION

Education plays a significant part in the economic development of a country. Pakistan is a developing country situated in the Western part of South Asia. The total population of Pakistan is 188 million; 62% of its population lives in rural areas, and 60% depend on agriculture for their livelihood. The gross domestic product (GDP) of Pakistan is 243.6 billion US$, and the GDP per capita income of the people is 1316.14 US

Dollars (World Bank, 2016). At national poverty line, the poverty head count ratio is 29.50%, and its inflation rate is 8.04%, which is difficult for the people who face extreme poverty (UNESCO, 2016; World Bank, 2016).

According to education for all (EFA) 2008 report, India has high chance to achieve the Universal Primary Education of Millennium Development Goals (MDG) by year 2015, while Pakistan cannot. This is because without the effort of families, communities and policy makers it is not possible to achieve the target of 88% literacy rate by the year 2015. For gender and rural and urban disparities, it is 58% which is far behind the universal primary goal achievements (ASER, 2016).

According to the study of Barro and Lee (2001), the average year of schooling in 1960 to 2000 has significantly increased in adult men and woman in South Asia except Afghanistan, whereas Bangladesh and Nepal are particularly unassertive in the region. The increasing literacy rate of India is comparatively better than that in Pakistan with its economy growing faster in recent years. Sri Lanka has the best literacy achievements in South Asia with 92.63% literacy rate, which is preeminent in the region, compared to India and Pakistan. In case of Gender Parity Index, there is a huge gender gap in the average educational attainment in South Asian countries such as India, Pakistan, Bangladesh and Afghanistan (World Bank Data, 2016).

The education system of Pakistan consists of subsequent structures which are pre-primary, primary, middle (lower secondary), secondary, higher secondary, and higher education (University Level of Education). Pre-primary school children's ages are 3 to 5 years; primary consists of 1st class to 5th class with children aged 5 to 9 years. Middle school (lower secondary) includes 6th class to 8th class, and the ages of the children are 10 to 12, while secondary level consists of class 9 to 10th. Some diploma and vocational schools give admission after the secondary class certification (UNESCO, 2012). Pakistan is far behind in achieving its target in universal primary education despite its policy commitment and assurance by the government of Pakistan.

Currently, Pakistan gross enrolment rate is 85.9% while the specified goal was to achieve 100% by the year 2015. 21.4 million children aged 5 to 9 years are in primary school, while 68% are already enrolled in schools in which 6.5 million are girls (44%) and 8.2 million are boys (56%) (EFA Report, 2014). Though the Government of Pakistan provides free primary education, there are still children that do not go to school, because their parents are illiterate. Cost of education is a big problem, which makes households hesitate to send their children to school (Kadzamira and Rose, 2003).

The investigation from developing countries, including India and Pakistan, showed that only 65% of grade 3 students were able to solve a one-digit subtraction, while only 59% were able to solve simple multiplication problem and only 24% were able to read and write. Also, less than 20% could understand a simple paragraph of Urdu (Pritchett and Beatty, 2015).

Therefore, concentrating on interventions, curricula and policies, it is important to conduct a fruitful investigation to solve the problems faced by the school children. Studies in such educational research are significant for policy makers, researchers, teachers, parents and administrators (Graesser, 2009).

Education is an investment in human capital development. Productive and highly skilled labor force is the result of systematic reforms in educational policies and is the requirement of time, which shows the quality of a system. This mechanism is based on the implementation of planning and good policy formulation (Hallak, 1995).

Since Pakistan came into being, a total of nine booklets have been published on educational policies, in which only one document 1972 was established, while all the remaining eight documents failed to dwell on public welfare. This is due to improper funding, political ambiguity and flaws in the administrative structure of the country. The funds which were granted by the international organizations to improve absenteeism in schools were not properly utilized by the government, hence it badly affected the education sector in the last few decades (Khan et al., 2016).

The quality and standard of education in rural areas is dropping and causing huge rural/urban disparities and inequalities in Pakistan. The Education for All Report (2013 to 2014) stated the educational status of low income countries across rural areas of Pakistan; there is widespread learning crisis due to deficiencies in quality of education (Agrawal, 2014).

However, the public-private strategy of education in Punjab is adopted by the government but there is no proper way to understand the gap in educational achievements. The unsatisfactory level of students' achievements in Punjab, Pakistan indicates that many children are unable to pass the test in their learning levels (Andrabi et al., 2007).

Pakistan is lagging behind in attaining her goals in the field of free and compulsory education. This research will elaborate the key problems in the country that hinder households to send their children to schools.

Objectives of the study

1. To identify the factors that diversify households' interest in educating their children and their future expectations.
2. To know the relationship that exists between households' background and their participation in their children's education.
3. To classify the central factors that hinder households' children from being educated.

This research article will be much helpful to policy makers, and the researchers in finding out the hindrances to educational achievements in Pakistan, and household

behavior towards their children's education.

Prior theories related to returns to education and dynamic factors

The research can generally be fragmented into three primary areas of empirical research, though of course there are many overlaps in terms of sub- groupings and practice. The three principal areas are as follows: theories connected to living discourses, households' assets, education, distance from school to home and participation of the child in his education.

The theories related to children's discrimination and bias in relation to education, and finally theories related to provision and use of basic services provided to household and their children such as free education services in Pakistan were studied. There is limited literature on theoretical clarification as to why diverse individual households have different thinking and expectations from education. Different research works have only focused on certain schools instead of analyzing and going deeper into why households' decision is important in the education of their children.

Patrinos and Psacharopoulos (2002) in their research estimate that 27% of average global private return is due to primary education. They also indicate in their research that the contributions of primary education to better natural resource management play an important role in growing the economy of a country.

Becker (1962) and Mincer (1974) evolution in human capital is based on education and training, which has direct relationship with the earnings of an individual. The coefficient of school years in Mincerian earning function points to the returns to schooling, as an additional year in school increases the earnings of an individual.

Hanushek and Kimko (2000) described that education is a circulation of technological information in an economy. Studies from Pakistan suggested low rate of returns to education at different levels of education, paralleled to other emerging economies. The earning function for different levels of education was applied for the estimation of results (Haque, 1977; Guisinger et al., 1984).

Epstein and Jansorn (2004) stated that household participation has an adjacent association with the success of schools as well as in the development of students. Those schools who provide high quality environment involve the parents of the students in direct communication about their children's future expectations.

Parents, teachers and students' participation can improve the educational level of a student in school as well as the child's interest level. Lloyd and Grant (2009) stated that the quality of education in school depends on the engagement of parents in the school activities. He further stated that, it is clear that participation of parents with even little educational background contributes to children's academic progress.

In addition, even those households who are educated up to 10th grade take interest in the education of their children. However, families in Pakistan focus more on boys' future earnings and goals than girls because they leave their parents after marriage; on the other hand, parents have more expectations from boys than girls in terms of finances and better life style (Zeira and Dekel, 2005). Mansory (2007) described the main causes of school dropout in Afghanistan. He mentioned that due to early marriages, boys and girls leave school and start to work because of household responsibilities. With the unpaid domestic work at home, when girls after marriage shift to their husbands' house they stop school and concentrate on their husbands and other family members. Family background is also an important factor and one of the main causes of school dropout. Odaga and Heneveld (1995) described in their research that households consider girls' education as a waste of money since parents think that girls are to be married as early and as soon as possible.

Sathar and Lloyd (1994) noted distance as a hindrance for most of the female students, resulting in high level of dropout or long absenteeism. If the distance from home to school is more than a kilometer, most of the girls lose interest to go to school, and this is due to the poor infrastructure in the rural areas as well as the cultural barriers. There are no high gender differences in primary schools in Lahore, Pakistan; whereas, in other parts of Pakistan, the distance from girls schools to home has significant negative impact on their enrolments (Alderman et al., 1996).

Another study in India has shown that using bicycle for long distance school plays an important role in increasing education attainment. Muralidharan and Prakash (2013) described that the enrollment rate in rural India has increased as girls are given bicycle to school, which also reduces the gender gap in the region. They stated that there was 32% increase in secondary school enrolment rate, and 40% decrease in the gender gap.

Gertler and Glewwe (1990) stated that distance from schools, local teachers and teaching quality influence students' interest in their studies. The indirect cost of communication and transportation system is also a big problem for the parents, who send their children to school from their out-of-pocket charges. Research from Asia offers many comprehensive studies on household decision for their children, and expectations for future goals. Studies also found out that there are number of problems associated with the wellbeing of children in some parts of Asia, and this is a big concern for the educational system.

Household expectations and returns from education

Households' decision-making and the return expectation

in case of gender are different. From the assumption of household model, we can observe that parents are altruistic in their comportment towards their children. Parents in terms of human capital accumulation and consumption care about the present and future expectations (Emerson and Souza, 2002a).

It is also discussed in some research studies that parents have special preference and sympathies with the same gender, like father spends more time during work with his son and mother with her daughters while doing work at home (Thomas and Perry, 1994).

According to the study of Emerson and Souza (2002), domestic work at home has a negative impact on the schooling of the female child. The girl child mostly spends her time at home and helps her mother in household chores, while the father has the same relationship with his son. They further explained in a study in Brazil that parents who do not participate in the schooling of their female children tend to give more attention to their boys' education. There is gender discrimination in here (Emerson and Sousa, 2002b).

Horowitz and Souza (2016) using the instrumental variable approach, described the robust monotonically decrease association among the instrumented income of households and the progression of educational attainment of households. This association depends on the child's academic performance in poor household, which is an important issue for policy implications. Shah and Anwar (2014) stated in their research work in Southern Punjab Pakistan, that parental education and family income have a significant effect on the education attainment of their children. They found that parental participation in academic activities motivates their children, thus improving their cognitive skills and academic achievements.

Munda and Odebero (2014) explained that EFA is still a big challenge for the poor households of the developing countries, that are unable to finance their children's education. They discussed in their findings that there is a significant positive association between unit cost and academic attainments.

Despite the financial aid given by government for education, poor households in developing countries still find it difficult to send their children to school. In another study, Karemesi (2010) found out that examination fee, cost of text books, school uniforms, transportation, sports and feeding are a big problem towards achieving the Universal Basic Education, especially for the low income families. Literature in various field mentioned the dynamic reasons for the low participation of household in the education of their children. This is the basis for low literacy rate and high dropout, and all due to the poor erection of educational policies that affect the poor household to achieve their education in developing countries.

In Pakistan, very little attention has been given to this problem, and there are very limited discussions on households' interest in educating their children. This research will enhance the weaknesses of households in Pakistan. The study will explore some of the issues which stop households to send their children to school. This research will also provide an opportunity to policy makers, organizers and authorities in the field of education to make policies and strategies in the light of the growth and development of the society. The study will also explore the literature regarding the behavior of household towards the education of their children.

METHODS OF ESTIMATION AND DATA

To obtain better response for research questions, it is important to use mixed approach to understand the problems and expand the thoughtful research hitches, especially in the field of social sciences (Creswell, 2013).

Many researchers have debated about the use of qualitative and quantitative methods in research. In qualitative method, researchers use phenomenological approaches, which are naturalistic inquiries; while in quantitative research, experimental and non-experimental quantitative approaches are used to measure hypothetical questions. Quantitative research is based on casual determination, generalization and prediction of findings (Patton, 1990).

In this study, we used the quantitative method in order to approach the flaws in the educational sector of Pakistan and to understand the main factors that affect the schooling decision of households. This research evaluates the impact of public educational policy implication on households' expectations from returns to education in Province Khyber Pakhtunkhwa, Pakistan.

The main purpose of the counterfactual evaluations is to elaborate what would have happened if the policy had not been taken. The quasi-experimental approach is used to answer this question in order to pretest and compare the treated and control groups. Therefore, in a non-random research, it is important to estimate the matching method by using statistical techniques. The detailed discussion for problem evaluation is mentioned below.

Problem evaluation

Empirical methods used in development economics have been technologically advanced to give answers to counterfactual questions, as studies endeavor to estimate the mean effect of the treatment group participating in the program.

An inference is required to know about the outcome for the treatment group; and when they are not treatment group, it is called control group. The experimental methods have advantages over non experimental studies, which have the capability to create a control group with the characteristics of the same dissemination as the treatment groups. For such methods, the difference of mean outcome will be calculated as treatment effect. With respect to their participation, the status and characteristics of treated and control groups are different. A biased result occurs between the two groups, when estimating the treatment effect as the difference of mean outcomes.

In order to calculate the average effect of an individual program in non-experimental method, matching method is generally used. By using this method, we compare the outcomes of individual groups who participated with non-participants, and observed characteristics are chosen on the basis of similarity in matches. Let us assume that we have two groups of household members: those who enroll in the school year (2013 to 2014) and completed their education and those who did not complete their education in the same year. Differentiating these two groups was done based on participation status.

Conceptual framework and assumptions

The important issue in evaluating the impact of education on household behavior is the specification of the average treatment effect. Rosenbaum and Rubin (1983) defined the average treatment effect (Δ_i) in a counterfactual framework as;

$$\Delta_i = Y_S - Y_N \qquad (1)$$

Y_S is the outcome condition on schooling $(P=1)$

Y_N is the outcome condition on non-schooling $(P=0)$

In estimating the impact of this equation, a serious problem arises. That is because either $Y_1 \text{ and } Y_2$ are not normally observed, but none of them for each household was recorded. So, the important assumption for this framework that can be stated is that individuals selected into both treatment and non-treatment groups have prospective outcome in both positions. One position is consistence while the other is not as observed. Therefore, this framework can be expressed as follows:

$$Y_i = D_i Y_{iS} + (1-D_i)Y_{iN}$$

$$D = 1,0 \qquad (2)$$

Suppose P is the probability of observing a household with D=1, so the average treatment effect, t, can be illustrated as follows,

$$t = P \cdot \left\{ E\left(Y_S | D=1\right) - E\left(Y_N | D=1\right)\right\} + (1-P) \cdot \left\{ E\left(Y_S | D=0\right) - E\left(Y_N | D=0\right)\right\} \qquad (3)$$

This equation means that the crucial problem of causal inference stems from the fact that the unobserved counterfactuals cannot be estimated (Smith and Todd, 2005). This situation requires one to employ the propensity score-matching (PSM) method in order to address this crucial problem (Rosenbaum and Rubin, 1983). Therefore, the Logistic Regression is the utmost generally used method for estimating the Propensity Score. This is used to predict the probability that an event is arisen.

$$Y(1 \, or \, 0) = \beta_0 + \sum_i \beta_i X_i \qquad (4)$$

Now when estimating the treatment effect based on propensity score, the conditional independence assumption (CIA) is required, which can be written as $(Y_N, Y_S) \perp D_i | X_i$, a first assumption. While in the second assumption, the average treatment of treated (ATT) is taken, which ensures that the individual with similar X values as explanatory variables have positive possibility of being a participant and non-participant (Heckman et al., 1997). Here the average treatment effect on treated can be illustrated as follows,

$$ATT = E\left(Y_{iS} - Y_{iN} | D=1\right)$$
$$= E\left\{ E\left(Y_{iS} - Y_{iN} | D_i = 1, Y_i(1 \, or \, 0)\right)\right\}$$
$$= E\left\{ E\left(Y_{iS} | D_i = 1, Y_i(1 \, or \, 0)\right) - E\left(Y_{iN} | D_i = 0, Y_i(1 \, or \, 0)| D=1\right)\right\} \qquad (5)$$

The first term is the treatment effect that we are going to isolate as

an average in the treatment group, which is the group of household that participated in the education of their children.

So, what will be the difference between the non-participant groups, which is the selection bias between the two groups? As the data about $E(Y_S | D=1)$ is already available from the participant groups, we have to find out the $E(Y_N | D=1)$, as the data on the non-participants support the classification of $E(Y_N | D=0)$ only. That is why the difference between $E(Y_S | D=1) \text{ and } (Y_N | D=1)$ cannot be observed for the same household members. As Rubin (1977) stated, an assumption that a set of observable covariates X, the potential outcome which is non-treatment outcomes are independent of the participation status of CIA (Conditional Independence Assumption), which is $(Y_N \perp D | X)$.

Therefore, after the modification of the potential outcome its mean is the same for D=1 and D=0, $(E(Y_N | D=1, X) = E(Y_N | D=0, X))$. This will allow us to use matched non-participant household members to explain how the participating group members would have performed, if they had not participated. Hence, we assumed that outcomes are conditionally mean independent of participation after conditioning on a set of observable characteristics.

Heckman et al. (1997) stated that between the outcomes of participants and non-participants their possibility will be a systematic difference due to many reasons. These differences may be due to the variety of unmeasured characteristics or outcome level of differences $(E(Y_S - Y_N | D=1))$. This might arise when participants and non-participants belong to different groups.

Angrist and Krueger (1999) worked on program evaluation and natural experiment approach. To estimate the effect of getting treatment randomly is not possible. The propensity scores are an alternative method for this procedure. In propensity score matching (PSM), creating pairs of the treatment and control components, with the same values related to propensity score perhaps covariates the disposal of all unmatched units (Rubin, 2001).

Propensity score matching

Propensity score matching is mostly used to match two groups of topics, but it can be estimated in more than two groups. Rosenbaum and Rubin (1985) for the first time stated the concept of Propensity Score Matching: the selection bias with principal emphasis on making casual extrapolations when the data set is based on non-random samples.

Also, the difference-in-difference approach using propensity score matching was developed by Heckman (1997). Becker and Ichino (2002) stated in their research work that propensity score method is a two stage method. The first stage as mentioned earlier consists of the probability model (Probit or Logit) which determines the propensity score of the household's characteristics. where β_i is regression coefficient to be predicted and X_i is an independent variable to be clarified. For propensity score matching, we applied the following equation:

$$P_{score} = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_n X_n)}} \qquad (6)$$

When propensity score is estimated, the appropriate matching technique is implemented. There are five main practices of Propensity Score Matching. The 1st is the Stratified Matching, the 2nd is Nearest Neighbor Matching, 3rd is the Radius Matching, 4th is Mahalanobis Metric Matching and the 5th and last one is Caliper Matching. While in the second step, each household group was matched up to predict households with the similar propensity score values. To estimate the average treatment effect, Nearest Neighbor Matching (NNM) was applied.

Data and definition of the variables

Brief history of the household survey data

The household survey data were launched in 1963, and named as household integrated economic survey; while in 1990, the questionnaire was revised based on national accounts to fulfill the deficiencies in data collection. Later on in 2003 to 2004, the survey was renamed as Pakistan Social Living Standard Measurement (PSLM) and the Household Integrated Economic Survey (HIES) segment was completed. The main idea of the PSLM data project was to collect the information in social and economic indicators of the households through survey.

In July 2004, the project was initiated and continued till June 2015. The basic purpose of this project was to assist the programs launched for the Millennium Development Goals to formulate poverty deterioration and other development plans, in the four provinces of Pakistan at district level. Therefore, the data help in providing information about social, income and indicators and the 18 targets which were mentioned by the UN for the implementation and fulfillment of Millennium Development Goals by the year 2015. The main indicators were based on demographic characteristics, education, health, employment, assets and water supply and sanitation (PBS, 2017).

Pakistan Bureau of Statistics had developed its own urban and rural area sampling frame in Pakistan. The cities and towns were divided into enumeration blocks, and each enumeration block consisted of 200 to 250 households. The enumeration blocks were further classified into three income groups, which were low, middle and high income, and the living standard of the people was patterned. Therefore, rural area frame work was based on a list of villages published by the Population Census Organization as part of the 1998 census.

Getting the data and the selection of variables

The empirical analysis is based on the household level PSLM data set for 2013 to 2014. The micro- data were obtained from Pakistan Bureau of Statistics to investigate the main problems faced by households. The data consisted of four provinces of Pakistan, namely Khyber Pakhtunkhwa, Punjab, Sindh and Baluchistan, Gilgit Baldistan and Capital Territory Islamabad.

We selected the province Khyber Pakhtunkhwa from the data of all over Pakistan based on 17989 households. After removing the missing values from the data and screening the data, a total of 4388 household members were selected from Khyber Pakhtunkhwa Province for further analysis. The factors which affect the enrolment of under 20 years old household members were based on the following variables: number of household members, age of the household head, number of workers in all sectors, number of workers in the agricultural sector, highest education level of household head, distance from school, assets of the household, such as bicycle, radio, mobile phones/PCs and their literacy rate. After the selection of the variables, the data were further analyzed through Microsoft Access, Excel and R-statistics. Matching technique was applied to the model.

As the PSLM data is non-randomized and based on stratification used to investigate the factors that affect the household decision, we used the matching method. When the randomization was not possible, we did comparison between control and treatment groups, in terms of the differences in their characteristics. That is why the households who are affected by the policies or as treatment group may be different from those who are not affected (the control group).

Similarly, the treatment effect may cause outcome differences. In the field of educational research and its policies there are many covariates due to dynamic factors that affect the outcomes and statistically it is very difficult to analyze through traditional methods. As household education, number of worker, family size, distances from school, household assets and literacy rate are taken as an outcome variable; therefore to estimate such variables we investigated the balance between the treatment and control groups. Then we compared these two groups with their covariates, by using the Propensity Score Matching method as an alternative method to apply the logic of balance between the two groups.

For this purpose, we developed the model to elaborate the study, and investigated the problems. Table 1 shows the selected variables and their definitions.

EMPIRICAL RESULTS

The empirical analysis for completion and non-completion of school in the last year involved two steps of estimation: the household members who completed school last year and those who did not. The first step consists of impact analysis tracked by a description of propensity scores for the treatment variables. To predict the probability of school completion, a logit model was introduced. The results of the propensity score matching are given in details below. Lee (2008) described that the propensity score matching is used to balance the observed dissemination of covariates between the treated and control groups.

Therefore, the success of propensity score assessment is the resultant balance. The effect of those household members who did attend school last year was further estimated through the nearest neighbor (NNM) method. The empirical results for both control and treatment group were estimated. Table 2 shows the descriptive statistics of the sample variables in each category for all the data. The treated group in Table 2 consists of 177 household members who did attend school last year with all their members and did complete school; while for control group, it was 4388 members, and consisted of household members who did not complete school last year. In Table 2, we applied the effect size based on means. When the studies for meta-analysis are based on standard deviation and means, we usually prefer standardized mean difference, raw mean difference or the response ratio for the size effect. The transformation of all effect size in standardized mean difference (d or g) is based on common metric, which thus gives us the ability to put measures of different outcome trials in the similar synthesis.

Therefore, size effect is widely used in meta-analysis as well as in primary research. The studies which are based on two arguments of the standardized mean

Table 1. Definitions of variables.

Variable name	Definition	Unit
Y	=1 if all household members under 20 years old enrolled in school/institution and did complete the class in last year	Dummy
Age	Age of household head	Age
No of worker	Number of workers in all sectors	Number
No of agric work	Number of workers in the agricultural sector	Number
High edu	Highest education level of household members Less than class 1 = 0, Class 1 to 10 = 1 to 10 Polytechnic diploma = 11, Associate degree = 12, Bachelor (BA) = 13 Post graduate (MA) = 14, Ph.D. =15	Dummy
Dist to school	The closest distance from the school/institution where household member are attending	Km
Bicycle	=1 if household possesses a bicycle or more	Dummy
Radio	=1 if household possesses a radio or more	Dummy
PC	=1 if household possesses a PC or more	Dummy
Literacy rate	Rate of all family members 10 and older can read with understanding	Ratio

Source: Pakistan social and living standards measurement survey ROUND-IX (2013-14).

Table 2. Descriptive statistics of sample in each category for all data.

	Treated (Y=1) N=177						Control (Y=0) N=4.388				
Variable name	Mean	S.D.	Max	Min	Std mean diff		Mean	S.D.	Max	Min	Unit
Hhh age	53.08	13.96	98.00	18.00	-8.16	**	54.23	12.66	99.00	17.00	Age
No worker	2.11	1.47	8.00	0.00	-29.86	**	2.55	1.62	25.00	0.00	Number
No agr work	0.32	0.51	2.00	0.00	-1.63	**	0.33	0.55	2.00	0.00	Number
Hh edu	10.59	3.11	20.00	1.00	57.44	*	8.80	3.46	20.00	1.00	Dummy
Dist. school	1.68	1.50	7.00	0.00	29.07	*	1.24	1.32	7.00	0.00	km
Variable name	Number of hh (=1) (%)		Max	Min	Std mean diff		Number of hh (=1) (%)		Max	Min	Unit
Bicycle	46.00	(26.0)	1.00	0.00	6.96	**	1.006.00	(22.9)	1.00	0.00	Dummy
Radio	9.00	(5.1)	1.00	0.00	-3.19	***	254.00	(5.8)	1.00	0.00	Dummy
PC	160.00	(90.4)	1.00	0.00	-3.43	***	4.011.00	(91.4)	1.00	0.00	Dummy
Variable name	Mean	S.D.	Max	Min	Mean raw diff		Mean	S.D.	Max	Min	Unit
Literacy rate	0.61	0.27	1.00	0.00	*0.07*	***	0.54	0.24	1.00	0.00	ratio

Signif. Codes: N.S. >=0.10; * P <0.10; ** P <0.05; *** P <0.01 based on the two sample t-test.

difference are comparable (Heges and Olkin, 1985). On the other hand, the raw mean difference, which is denoted by (D) can be used as the effect size, when the scale of the outcome is either well known or characteristically evocative, because of its extensively usage. In the analysis, a part is used for the similar scale. This effect size is implemented (Borenstein et al., 2009).

The descriptive statistics of the study suggest that the standard mean difference, with its value -8.16 for the household head age has negative effect on households' school completion between the two groups. It is discussed in the previous literature that young people have the tendency to send their children to school, and they are able to complete their school. This is due to the social mobilization and the awareness by different non-profit organizations in the province that younger parents prefer to send their children to school. The reduction in the number of workers, number of agricultural worker, with its

Table 3. Estimated probability model in logit for PSM.

Explanatory variables	Estimated coefficients		p value
Intercept	3.06E-02	*	0.05492
Hhh age	-4.22E-04	*	0.06622
No worker	-7.02E-03	***	0.00021
No agr work	8.70E-03	N.S.	0.11598
Hh edu	5.75E-03	***	0.00000
Dist. school	6.53E-03	**	0.00286
Bicycle	1.16E-02	*	0.08715
Radio	-6.94E-03	N.S.	0.56925
PC	-1.70E-02	*	0.09786

Signif. codes: N.S. >=0.10; * P <0.10; ** P <0.05; *** P <0.01.

mean values is -29.86, and -1.63. This shows that, education attainment decreases the number of workers and household income. This is because, when households decide to send their children to school it decreases their work participation.

The standard mean difference for the household with its level of education has a positive effect and is increased by an average of 57.44. While the distance from school has also positive effect on completion of school, the mean difference between the treated and control group is 29.07, which shows that households can decide to send their children to long distance school.

The aforementioned discussion of this table was based on the households' demographic characteristics. The second part of the table consists of the assets of the household who possess bicycle, with its mean differences. This shows that there is positive significant relationship between completion of school and bicycle used as an asset by households. This shows that, its standard mean difference is 6.96. While owing of radio and mobile phones/PCs has negative standard mean differences (-3.19 and -3.43) between both the treated and control groups. The last variable as literacy rate has positive relationship with school completion; its mean difference is 0.07, which is the outcome variable.

Likelihood method and estimations

Here we estimated the propensity score matching, although it can be estimated by using models like discriminant analysis, boosted regression and probit regression (McCaffrey et al., 2004). The logistic regression is typically used for the analysis. Matching packages and Matching estimate propensity scores expended the logistic regression as the default option (Ho et al., 2011).

The fit of the model cannot be evaluated, when using the default option for estimating propensity scores. Therefore, the logistic regression is recommended to run and accomplish the model fit. Estimation of the logistic

regression in propensity score matching was recorded. The significant estimates are determined by the low p-value (that is, <0.05). Authors suggest that both statistically significant variables are related to selection (Austin et al., 2007).

Table 3 shows the empirical results of probit model. This indicates that the estimated coefficient of number of workers is -7.02, which has significant negative effect on completion of school for all the household members last year. The reduction in number of workers shows that the probability of school completion in the last year decreases the number of workers in the household. The slope of coefficient for number of agriculture workers has a positive effect, which is 8.70.

This means that the number of agriculture workers is increasing by 8.70, if the probability of school completion by a one unit is increased for all the household members. This is because when the children of the household come back from school they are engaged in agricultural work. The estimated coefficient of household education is 5.75. This shows the positive effect on the probability of school completion, and has a significant effect on household educational level.

Bjorklund and Salvanes (2011) stated in their study that there is a strong correlation between the educated households and their children. Family background strongly affects their children's education. The household takes decision about longer distance when they want to send their children to school. This is because there is a correlation between the use of bicycle and distance from school. The estimated coefficient value, 6.53 suggests that an increase occurs in distance when a unit change takes place in the probability of school completion. The use of bicycle has also positive significant effect. The estimated coefficient of the use of bicycle is 1.16 and has positive impact on school completion. This is because an increase in the number of bicycle can increase education attainment, if the schools are situated at a longer distance.

Muralidharan and Prakash (2013) by using the triple difference approach to investigate the bicycling program

Table 4. Descriptive statistics of sample in each category for matched data.

| | Treated (Y=1) N=105 | | | | | | Control (Y=0) N=201 | | | | |
Variable	Mean	S.D.	Max	Min	Std Mean Diff		Mean	S.D.	Max	Min	Unit
Age	52.78	11.42	90.00	34.00	5.91	N.S.	51.89	11.51	95.00	19.00	Number
No of worker	2.11	1.47	8.00	0.00	9.51	N.S.	2.18	1.36	6.00	0.00	Number
No of agr worker	0.32	0.51	2.00	0.00	7.42	N.S.	0.38	0.62	2.00	0.00	Number
Higher edu	10.59	3.11	20.00	1.00	6.51	N.S.	10.63	3.71	20.00	1.00	Dummy
Dist to school	1.68	1.50	7.00	0.00	3.72	N.S.	1.69	1.81	7.00	0.00	km
Bicycle	0.26	0.44	1.00	0.00	10.39	N.S.	0.30	0.46	1.00	0.00	Dummy
Radio	0.05	0.22	1.00	0.00	10.45	N.S.	0.06	0.24	1.00	0.00	Dummy
Mobile/PC	0.90	0.29	1.00	0.00	15.45	N.S.	0.92	0.27	1.00	0.00	Dummy

Std mean diff: N.S. >=0.10; * P <0.10; ** P <0.05; *** P <0.01 based on paired t-test, the test for equal balance in the estimated prob between treated and control (nboot = 1.000).

in rural India, stated that the treated villages, where the households benefited from the program, the schooling attainment increased by 30%. The program was launched for the girls whose schools were far from their homes. It also reduced the gender gap by 40% in secondary school level enrollment.

While in case of Mobile Phones/Pcs, negative effect on school completion and the slope of the coefficient is -1.70. This indicates that the use of mobile phones has negative effect on school completion. The probability of a unit of school completion for all members of the household reduces the use of mobile phones up to, -1.74, and has a significant effect.

Treatment effects

Kolmogorov-Smirnov test was used for the data analysis, which was based on the bootstrap p-value. This is widely used to provide the precise estimation, even if the compared distributions are not exclusively continuous. This test provides equal balance in the estimated probability for both the treated and control groups with number of bootstraps, which is based on Monte Carlo simulations used to determine the appropriate p-value. However, we estimate the asymptotic distribution for the cases of matching estimate, when the conditional bias is ignored, and also, the matching estimators for the fixed number of matching may not extend to the semi-parametric efficiency bounds. Therefore, an asymptotic variance estimator is proposed (Abadie and Imberns, 2006). Finally, the average treatment effect of the household participating in education was assessed by comparing the deviations in individual outcomes between participants and their matched counterparts (Table 4).

Table 4 shows the descriptive statistics of sample in each category for matched data. The table is based on both treated and control groups, and their standard mean differences. The descriptive statistics for matched data show that the variables, selected for the difference

between their mean values were based on household demographic as well as assets variables. The demographic variable with their standard mean differences for the treated and control group can be illustrated as follows: the standard mean difference for the household shows that the number of workers, number of agriculture worker, households' education, distance from school, bicycle, radio, mobile phones/ Pcs has non-significant positive value. This shows that, the model is fit for the treatment effect for both the control and treated groups. Therefore, after applying the paired t-test, the test for equal balance in the estimated probability between the two groups, the outcome variable will be estimated to know the impact of literacy rate on household school completion, as shown in Table 5.

Table 5 shows the average treatment effect on both treated and control group. A total of 105 household members were in the treated group, and 201 in the control group. This shows the outcome variable, literacy rate has negative impact on household school completion. This is because school graduates have very less capabilities to read and understand a single sentence. Table 5 suggests that literacy rate for both treated and control group has a significant negative effect on school completion for all the members of the household. This is because of the poor quality of education, insufficient budget for households and distance from school to home.

Khan et al. (2016) described in their research work on the study of South Asia, that households' decision making depends on returns to education. There are other external benefits in spite of returns to education, improvement in the health status of an individual, increases the income, rise quality of life, reduces family size, increases individual productivity, political awareness, and better childcare etc. They further described that the literacy level has been increased in South Asia for the last 15 years except Pakistan, which is far behind the targeted Millennium Development Goals and has the lowest literacy rate in the region.

Mostly researchers use the returns to education as the

Table 5. Average treatment effects (ATT) in each matched data for literacy rate.

Variable name	Treated (Y=1) N=105						Control (Y=0) N=201			
	Mean	Max	Min	Est. Diff	AI SE	-	Mean	Max	Min	Unit
Literacy rate	0.59	1.00	0.00	-0.05	0.02	***	0.63	1.00	0.00	ratio

Signif. codes: *** $P < 0.01$ ("AI SE" is the matching corrected standard error based on Abadie and Imbens (2005).

human productivity and a year increase in education can increase the individual earnings, while the returns and household expectation with the literacy rate as an outcome variable has not been estimated in the region. The research work shows that the low level of education attainment by the children of the household is due to lack of cognitive skills and their achievements. The students are unable to even understand a single sentence, to read and solve a simple problem. This is due to the lack of quality curriculum and untrained teachers in the region.

Therefore, the households in Khyber Pakhtunkhwa, Pakistan are not interested in the schooling of their children due to lack of quality enhancement in the education system. Household considers sending their children to school as a waste of money and time. That is why households prefer to send their children to work in some workshops and learn some skills.

Conclusion

This work studies households' decision to participate in the education of their children. Before the analysis of the study, we were able to identify the World Bank and UNESCO data from 2016, that Pakistan has the worse situation in sending their children to school both in primary and secondary level in South Asian countries. The educational level of all South Asian countries was discussed (Khan et al., 2016).
In this study, we discussed those households who enroll their children in schools and completed their education. For this purpose, we selected Khyber Pakhtunkhwa Pakistan. We used propensity score matching method joint with the logistic regression model to estimate the situation of those households, with respect to the effect of different variables, which are: age of the household head, number of workers in all sectors, workers in agricultural sector, education of the household, distance from school, assets of the household and their literacy level.

After applying the average treatment effect on treated (ATT) of the household members, they were assessed by comparing the differences in individual outcomes between treatment and control group. It was suggested that literacy rate has a significant negative relationship with school completion. A total of 105 households from the treated group were matched with the 201 household members from control groups. This shows that the literacy rate has negative relationship with school completion and non-completion of school of the

household last year, for both control and treated groups. This is because the syllabus is not much effective according to the modern world requirement.

Low literacy has many causes, but the main reasons that effect the literacy level are as follows: socio-economic condition of the household, low household income, insufficient resources, child labor, 38% of a large number of people living below poverty line, deficiency in quality education, untrained and unqualified teachers, low level of cognitive skills, lack of facilities, and inadequate infrastructure.

However, the failure of educational policy since the existence of Pakistan is a big problem, that even educated households have lower cognitive skills. This shows the consequences of inadequate educational policies in Pakistan.

The findings suggest that without households' participation and community awareness, the decrease in the dropout from school would not be possible. Pakistan should give proper attention to their education system, which is badly affected. Poor communication and transportation system creates hurdles for people who want to send their children to school. The government should also provide well trained teachers, modern syllabus and quality environment both in public and private institutions.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Educational Research and Reviews

Full Length Research Paper

Self-efficacy as predictor of collective self-efficacy among preschool teachers in Turkey

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This study investigates the effect of preschool teachers' collective self-efficacy. A study group consists of 172 preschool teachers who are working in public preschools affiliated with the Ministry of National Education in different cities of Turkey. In this study, teacher self- efficiency scale is employed to assess professional efficiency perception of teachers. Schwarzer et al have developed the scale, Sünbül and Arslan studied validity and validity of scale, and adopted it to Turkish. For identifying teachers' collective self-efficacy, the Collective Teachers' Self-Efficacy Scale developed by Arslan and Sünbül (2006) has been applied. In data analysis, Pearson product-moment correlation, and simple linear regression analysis method has been used. As a result of the study, it was found that there was a positive relationship between teachers' self-efficacy and collective self- efficacy. Besides, it was found that teachers' self-efficacy significantly explain collective self- efficacy.

Key words: Teacher, self-efficacy, collective self-efficacy.

INTRODUCTION

Teaching is a profession that takes the administrative tasks related to education, teaching of the state (Dagli, 2002). Teaching is a significant profession that shapes the way of life and development of individuals, and society. For this reason, one of the basic elements that make teaching processes meaningful, effective and productive is the role of teacher (Alkan, 2000).

Teachers as the architects of the society must be trained at the level to meet the needs of the country and today's conditions (Kösterioğlu and Kösterioğlu, 2008). The extent to which the teacher have the qualifications related to the teaching profession and their attitudes towards the teaching profession has an important place

in the nature for the educated teachers (Capri and Celikkaleli, 2008; Bozdoğan et al., 2007; Aydın and Sağlam, 2012).

Proficiency is the ability to have the professional knowledge, skills and attitudes required to carry out tasks specific to a profession (Yesilyurt, 2011). According to Bandura (1977), competence refers to self-judgment on the capacity of an individual to organize and successfully perform activities necessary to demonstrate certain performance (Senemoğlu, 1997). There is an important place in the formation, development and orientation of society in education and training.

The architects of education and training are teachers

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(Cırcır, 2006). The level of teacher qualifications is also an important factor affecting the level of learning of the learners. The more qualified the teacher is, the greater the student learning and the persistence of the learning become (Karacaoglu, 2008).

It seems that the sense of the competence of teachers is very important in terms of learning and teaching activities in effective ways the teaching process is carried out, and motivating the students to learn. However, the teacher who has the responsibility of educating the individual should also have adequate education-teaching understanding, knowledge and attitude (Sünbül and Arslan, 2006). The competency level of teachers regarding interpersonal relationships is important in terms of their profession (Sünbül and Arslan, 2006). It is expected that teachers will have the ability to facilitate their learning, to be effective instructor, to organize their group work, and to attract the interest of their students as well as their knowledge (Karacaoğlu, 2008).

Although, the personality and professional qualities of the teachers have a great effect on the students at every stage of education, their role is more significant for the children who have newly separated from the family environment, recently joined a social atmosphere outside from their family, encountered a new and different model after the role models of their mother, father, relatives etc. (Koçyiğit, 2011). It is only possible to provide a quality education, a befitting structure and materials, a program suitable for its own purpose, through cooperation from administrators to teachers from the health personnel to the employees as a whole acting in the frame of common purpose (Zembat, 1992).

The teacher, who is one of the most important elements in pre-school education, plays an important role in the attainment of the goals, and quality of pre-school education (Koçyiğit, 2011). Traits of teachers are one of the main determinants that influence the quality of preschool education, and the development of the child. Children discover and benefit from the learning opportunities presented in a supportive environment that they are only valued, they are sure that they feel safe, and they are valued. The most important component of this supportive environment is a consistent, and secure relationship between the teacher and the child (MEB, 2012). The pre-school teacher is the person who is with the children at any moment, and the children trust a teacher who communicates with them and shares their own enthusiasm with them as well (Poyraz, 2011). The extent to which the child can discover, learn and know depends on how fast the child's environment is supportive, and what possibilities are offered to the child.

In addition to being a model for the students, the teacher plays an important role in preparing the necessary tools and materials for his education and training, in organizing the environment, transferring knowledge and following up the results and outcomes (Yeşilyaprak, 2004).

Teachers gain the significant part of their competencies in pre-service training, in other words teacher training programs (Yeşilyurt, 2011; Seferoğlu, 2004). The extent to which the child can discover, learn and know is correlated with how fast the child's environment is supportive, and what possibilities are offered to the child are closely related (MEB, 2012).

A good teacher continuously develops himself/herself from professional and personal aspects, explores and evaluates opportunities and possibilities for self-improvement (Seferoğlu, 2004). The teacher should be eager to develop himself/herself, and to become more professionally qualified. How they perceive the concept of professional competence is important for this. The cooperative behavior of a teacher who perceives that s/he is professionally competent may influence his/her behaviors. For this reason, the effect of perceptions of professional competence on pre-service teachers' competence to work with their colleagues was investigated in this study.

The main purpose of this study, was to investigate preschool teacher' self-efficacy as predictors of collective self-efficacy among a sample of Turkish preschool teachers. Based on the previous literature, the study research questions were:

1. What is the relationship between preschool teacher's self-efficacy and collective self-efficacy?
2. How would the preschool teacher's self-efficacy predict the collective self-efficacy of Turkish preschool teachers?

METHODOLOGY

Design of the study

This study was conducted with a causal design in order to investigate to what degree is the preschool teacher' self-efficacy in predicting collective self- efficacy. Causal design is a kind of research design that investigates the cause-effect relationship that occurs or already exists among some variables. When it is assumed that the relationship among the variables is a cause-effect relation, a causal research design is used (Karadağ, 2009). Taking this into account, the preschool teacher' self-efficacy is an independent variable, while collective self-efficiency is a dependent variable.

Participants

The sample set of the research was taken from preschool teachers from Turkey. 172 preschool teachers selected by random element sampling method consisted of study group. The teachers who took part in the study were aged between 24 to 43 years old (Mean=27.5, Standard deviation=3.2) 123 of the teachers were female and 49 were male. Occupational experience ranged from 1 year to 28 years.

Instruments

Teacher self-efficacy scale

Teacher self-efficacy scale was developed by Schmitz and Schwarzer (2000), and adapted for Turkish samples by Sünbül and

Table 1. Descriptive statistics.

Variable	N	Mean	Std. Dev.	Min.	Max.
Preschool teachers' self-efficacy	172	31.52	4.87	9	36
Preschool teachers' collective self-efficacy	172	40.3	6.2	12	48

Table 2. Relation between preschool teachers' self-efficacy and collective self-efficacy.

Variable	Preschool teachers' collective self-efficacy
Preschool teachers' self-efficacy	0.71

Arslan (2006). A 10-item teacher self-efficacy scale refers to rating on a 4-point likert type scale (1 = *not at all true,* to 4 = *exactly true*). Higher scores on the scale items indicate higher levels self-efficacy. The internal consistency coefficients of the scale were found to be 0.74.

Collective teacher self-efficacy scale

Collective teacher self-efficacy scale was developed by Schwarzer et al. (1999), and adapted to Turkish samples by Arslan and Sünbül (2006). A 12-item teacher self-efficacy scale refers to rating on a 4-point likert type scale (1 = *not at all true* to 4 = *exactly true*). Higher scores on the scale items indicate higher levels collective self-efficacy. The internal consistency coefficients of the scale were found to be 0.88.

Data analysis

In the research, teachers' collective self-efficacy scale and teachers' collective self-efficacy scale were filled by preschool teachers in the study group in order to obtain data related to collective self-efficacy and self-efficacy. Total scores for preschool teachers' self-efficacy, and collective self-efficacy were obtained from the completed scales. The analysis of the relationship between preschool teachers' self-efficacy and collective self-efficiency was made with 'Pearson product-moment correlation coefficients' technique. In order to determine explanatory power of preschool teacher' self-efficacy for collective self-efficacy, simple linear regression analysis was used. SPSS for WINDOWS 16.0 was used for data analysis. Significance level on research was accepted as 0.05.

RESULTS AND DISCUSSION

This section contains the findings of the research. Table 1 shows the descriptive statistic findings of pre-service teachers regarding perceived self-efficacy scores, and collective self- efficacy scores.

When Table 1 is examined, it is seen that pre-service teachers who participated in the survey had an average of 31.52 points of perceived self-efficacy score, and 40.3 points of average level of collective self-efficacy score. Table 2 shows the Pearson moments product correlation coefficient results determining whether there is a significant relationship between pre-service teachers' perceived self-efficacy scores and collective self-efficacy scores.

As a result of Pearson correlation analysis to determine the relationship between pre-school teachers 'scores obtained from "The Scale of the Perception of the Teaching Profession" and "The Collective Self-Efficacy Scale"; it was found that there was a positive correlation (r = 0.710) between pre-service teachers' perceived occupational proficiency scores and collective self-efficacy scores at p <0.01 level. There is a significant positive relationship between pre-service teachers' perceived occupational proficiency scores and collective self-efficacy scores. As teachers' collective self-efficacy increases, perceived occupational proficiency scores increases. As a result of the simple linear regression analysis of whether pre-service teachers' perceived self-efficacy scores explain their collective self-efficacy scores at a significant level, it shows that pre-service teachers' perceived self-efficacy scores explain about 50% of the total variance in their collective self-efficacy scores.

Conclusion

The results of the research show that the perceptions about their profession and collective self-efficacy levels of preschool teachers are significantly related. It can be considered that teachers with high level of professional perceptions are also successful in collective self-efficacy levels. Teachers with a low perception of profession may avoid working with others; they may also think that they are inadequate or unsuccessful.

The finding of this study is consistent with Bandura (1977) who submitted that, people develop special beliefs about their own coping abilities, based on their experiences, and behavioral change increases as their self-efficacy beliefs develop. Therefore, perceptions about themselves are important. It is important whether teachers can see themselves adequate in interpersonal relationship with others; this might affect collective self-efficacy levels especially in professional terms (Table 3).

Proficiency is the ability to have the professional knowledge, skills and attitudes required to carry out tasks

Table 3. Simple linear regression analysis on collective self-efficacy.

Variable	R	R^2	R^2_{ch}	F	df	Beta	β	p
Preschool teacher' self-efficacy	0.710	0.504	0.501	172.467	1/170	-	-	0.00**
	-	-	-	-	-	0.710	0.90	0.00**

specific to a profession (Yeşilyurt, 2011).

If the sense of occupational competence is in low levels, the individual who thinks that they are inadequate in their professional knowledge and background will not want to show their attitudes working together with their colleagues concerning what they will notice their trait in this manner. If the sense of occupational competence is high, it is expected that they will show more willingness to work with colleagues because they have high self-esteem. The sense of competence for interpersonal relations is also very important in terms of their profession (Sünbül and Arslan, 2006).

Work environments can also affect teachers' perceptions about their professions, and collective self-efficacy levels. An individual may be reluctant to work with other individuals in an environment where his/her professional knowledge is not referred, is not supported or appreciated, and his opinions and recommendations are not taken into account. In the school environment, it causes feelings of discouragement, insensitivity and insecurity to develop (Goddard and Woolfolk-Hoy, 2000).

It is also important to give the message that teachers are sufficient as individuals and as groups to strengthen their perceptions of occupational competence (Kurt, 2012). It is therefore important that the working environment allows one to work and to demonstrate professional knowledge. People who benefit from their own knowledge and skills may be more willing to work with other colleagues.

It can be said that it is important for teachers who should have some competence in fulfilling their teaching and responsibilities, to be ready for their profession by having the competencies they should have gained before the service. Teachers in areas where they think they are not professionally competent, they can develop themselves by using electronic resources and taking advantage of electronic media (Seferoğlu, 2004).

In service training activities for teachers will enable them to improve themselves in various subjects and providing trainings enabling them to benefit from their professional knowledge, will contribute because according to this research, the increase in the sense of occupational competence leads to the increase in collective self-efficacy levels.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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Educational Research and Reviews

Full Length Research Paper

Developing a scale for strategies used during the practice and learning of instrumental music

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The purpose of this study is to develop a valid and reliable scale to identify the strategies students who study instrumental music use during the practice and learning of instrumental music based on their own responses. The study group comprised of 358 students studying music education in five universities in the academic year of 2015 to 2016. The scale developed within the scope of this study includes five dimensions: attention strategies, rehearsal strategies, elaboration strategies, articulation-organization strategies and comprehension monitoring strategies. The scale has 39 items. There are seven items in the attention strategies dimension, five in rehearsal strategies dimension, six in elaboration strategies dimension, seven in articulation-organization strategies dimension and 14 in comprehension monitoring strategies dimension. The factor loading values of the items in the scale ranged from 0.513 to 0.813. Reliability coefficients for the scale's sub-dimensions were found to be 0.89 for attention strategies dimension, 0.81 for rehearsal strategies dimension, 0.85 for elaboration strategies dimension, 0.87 for articulation-organization strategies dimension and 0.93 for comprehension strategies dimension. It is believed that the scale will be a powerful tool for researchers in explaining levels of strategies students use during the practice and learning of instrumental music.

Key words: Instrument, practice and learning strategies, scale, attention, rehearsal, elaboration, articulation-organization, comprehension monitoring.

INTRODUCTION

Just like in every dimension of learning, the use of various learning strategies is crucial for easy and permanent learning of instrumental music, and in learners attaining the skill to learn independently. Learning strategies have been defined by many educators in various ways. Mayer (1988) defined learning strategies as behaviors intended to influence how learners process information. Learning strategies are the processes students use in learning on their own (Gagné and Driscoll, 1988). In a broader sense, learning strategies

are behaviors and thoughts that learners engage in during learning that are intended to influence their encoding process (Weinstein and Mayer, 1986).

According to Riding and Rayner (1998), individuals develop their learning strategies while they engage in learning materials that are initially inappropriate for their cognitive styles. Strategies can be learned and changed. Strategies, on the other hand, are individuals' fixed (unchangeable) essential characteristics. Learning strategy is a group or more of processes an individual

gains to ease the performance in a learning task. Strategies change depending on the nature of the task. Different learning strategies are used for different learning tasks. In this regard, educators have divided learning strategies into categories. Accordingly, learning strategies in each category include methods that will influence certain aspects of the encoding process to ease one or more types of learning outcomes and performance.

Learning strategies are divided into eight groups in the most recognized classification regarding learning strategies. According to this classification, learning strategies include rehearsal, elaboration and organization strategies for basic and complex learning tasks, rehearsal, elaboration and organization strategies for complex learning tasks and affective and motivational strategies (Mayer, 1988; Weinstein and Mayer, 1986). According to another classification, learning strategies are divided into five groups (Gagné and Driscoll, 1988). These strategies are attention strategies, short-term memory development strategies, encoding enhancement strategies, retention enhancement strategies and monitoring-guiding strategies. Some studies (Yokuş, 2009; Yokuş, 2010) in the field of music discuss learning strategies according to this classification.

Furthermore, learning strategies make up one of the two main dimensions of the Motivated Strategies for Leaning Questionnaire (MSLQ) developed by Pintrich, Smith, García and McKeachie in 1991. The strategies in the learning strategies dimension of Motivated Strategies for Learning Questionnaire (MSLQ) are collected in three groups. These strategies are cognitive strategies, metacognitive strategies and resource management strategies. Two (McCormick and McPherson, 2003; Nielsen, 2008) or three (Nielsen, 2004) of these strategies were focused on determining the practice and learning strategies used by students in the field of music.

Weinstein and Mayer (1986) emphasize that students should be aware of learning strategies in order for them to learn more effectively, to remember the information that has been stored and to motivate themselves. Moreover, frequent use of learning strategies can lead to a desire to be more successful in learning because these strategies are the most important parts of the learning process, and this process requires determining whether students use learning strategies or not (Güven, 2008). Measurement of levels of practice and learning strategies used in instrumental music can be possible with a valid and reliable scale developed on this subject. In order to understand how the practice and learning strategies classification used in this measurement tool, it will be useful to discuss the related studies in the field of music.

Strategies in studies in the field of music

The first practice and learning strategies found in studies in the field of music is rehearsal strategies. Strategies like problem solving, decision-making, participation in performance products come to mind when rehearsal strategies are discussed. These strategies can change according to musical learning areas. For example, rehearsal strategies in choir training include strategies designed to develop the critical thinking skills of the conductor. Rehearsal strategies designed within this structure necessitate performance skills, music literacy and music comprehension skill (Field, 1997).

In another related study, rehearsal strategies include the strategies an expert conductor-teacher uses in improvisational teaching. These strategies are verbal rehearsal strategies used for narration and evaluation during rehearsals and a series of active rehearsal strategies like modelling, creating links, doing vocal exercises and critical listening (Cruse, 2011). In studies, different than the studies of Field (1997) and Cruse (2011), rehearsal strategies are discussed as a sub-dimension of cognitive strategies (McCormick and McPherson, 2003; Nielsen, 2004, 2008).

Task strategies are the other practice and learning strategies encountered in studies in the field of music. Task strategies are the strategies used in organizing the parts of the piece meaningfully, selecting the problem areas and bringing together parts of the piece as a whole (Nielsen, 2001). Practice strategies are also among the strategies encountered in studies in the field of music. These strategies include students getting motivated, setting goals, self-assessing and their strategy use processes (Oare, 2007).

In another study on university students playing string instruments, practice strategies consist of strategies like repetition of the entire piece, repetition of little sections of the piece, doing technical works and analyzing the piece. Also, hand position transitions, practicing in unknown chords, playing slowly, using metronome for slow practice tempo, increasing gradually and playing the section many times are given as examples to practice strategies (Sikes, 2013).

Writing strategies in the field of music include writing or piece writing for learning in the pedagogical approaches used in the field of music theory (Kelley, 1997). Correction strategies are the strategies used to teach the transposition skill, and to correct orchestration errors (Dobroski, 1981).

Some studies on learning strategies in the field of music used the classification of the MLSQ. Strategies in this context are comprised of cognitive, metacognitive and resource management strategies (Pintrich et al., 1991). Cognitive strategies include strategies like rehearsal, elaboration, organization and critical thinking. Sample items taken from the scale in order to determine these strategies are:

"I select important technical and musical parts, repeating these over and over again", "I try to develop musical ideas by making connections between alternative

interpretations from listening to music and from lecturers" and "When I practice, I go through the music and try to find the most important musical ideas" (McCormick and McPherson, 2003; Nielsen, 2004; 2008).

Although metacognitive strategies in the field of music are also called self-regulation strategies, comprehension monitoring strategies, executive cognitive strategies, they are all used in similar context. Scales related to metacognitive strategies focus on how much students plan and observe and how much they organize their problem-solving during the practice time. Sample items are:

"When practicing, I set goals for myself in order to direct my practicing" and "I test my performance on the instrument to better manage my strength". Students' use of metacognitive strategies while practicing their instruments was determined in some related studies (McCormick and McPherson, 2003; Nielsen, 2004, 2008).

Similar to metacognitive strategies, in another study (Nielsen, 2001), under the name of self-regulation strategies, whether students exhibited enough self-regulation strategies or not through setting specific goals, strategic planning, self-monitoring and self-judgment was determined.

Resource management strategies include managing time and study environment, effort regulation, peer learning and help seeking sub-dimensions. Sample items from the "*managing time and study environment*" sub-dimension (Nielsen, 2004) are:

"I find it hard to stick to a practice schedule" and "I use my practice time wisely". The sample items (Nielsen, 2004) from the *"effort regulation"* sub-dimension are "I often feel so lazy or bored when practicing that I quit before I finish what I planned to do" and "I continue to practice even the music is boring and uninspired". The sample item in the "*peer learning sub-dimension*" is "When practicing repertoire, I often try to perform the piece for a classmate or friend".

Finally, the sample items in the *"help seeking"* sub-dimension are:

"Even if I have trouble learning the music, I try to work on my own, without help from anyone" and "I seek help from the teacher when I have trouble learning the music".

Another study on strategies in the field of music was conducted by Nielsen (1999a). Nielsen (1999a) determined a series of primary and support strategies helping the learning process. Primary strategies are strategies of selection, organization, making connections between the learning material and the preexisting knowledge, classification of learning material, making connections between the kinesthetic pictures and performing the material, and making connections between the playing of the piece and audiovisual, and visual elements.

Selection strategies are strategies that can be used to select the problem areas of the piece to be learned. These strategies include strategies like visual examination of the score, playing the sections close to the final tempo from beginning to the end, repetition by dividing the piece into different sections.

Organization strategies include strategies like combining segments of the piece to form a whole, playing by dividing the piece into sections with different lengths, playing segments in different tempi, playing each hand (unilateral play), and playing both hands (bilateral play). At the same time, strategies like playing by systematically altering the rhythmical structure of a segment, and playing segments in different tempi by using metronome can be included among the organization strategies.

Strategies to make connections the learning material with existing knowledge (integration) are finding different solutions for a problem, keeping to only one fingering of a segment to alter the solution for the problem and developing exercises based on parts of the piece. Strategies to sort the learning material (categorization) include strategies like dividing the piece into working areas (larger sections), doing markings in the score, minimizing patterns of movements to chords and overdoing the segments. Strategies to relate kinesthetic pictures to the performing of the material include mental rehearsal. These strategies are for mentally rehearsing the kinesthetic (physical) movements done while playing music without touching the instrument. Strategies to relate auditory factors to the performing of the material include playing segments along with a vocal expression and listening to others' performance recordings.

Strategies to relate visual factors to the performing of the material are strategies of identifying similarities and dissimilarities in the piece. In Nielsen (1999a) study, support strategies aim to influence indirectly the acquisition of new knowledge by focusing on the learner's state of mind. This category includes strategies of maintaining concentration on the task at hand, mastering anxiety and securing the efficient use of time. Strategies to direct attention to the task at hand are the strategies of activating and maintaining concentration or activating and maintain motivation. Strategies to master anxiety include strategies of mentally preparing for a public performance.

Strategies to secure efficient use of time are strategies that utilize the distribution of practice over time (massed vs. distributed practice, short-term vs. long-term). In addition to these strategies, they include strategies like pausing/resting, preparing the body and muscles for the practice activity, constructive self-talk, help from others, mental exercises and relaxation exercises.

A study on learning strategies in the field of music was also conducted by Leon-Guerrero (2008). Under the title

of self-regulation strategies, Leon-Guerrero (2008) described 21 types of strategies including strategies like playing from the beginning, repeating a measure, repeating a segment, practicing a group of notes and playing a group of notes backwards.

Practice and learning strategies classification the current study is based on

In the examples given from the studies in the field of music it seen that the definitions and classifications of practice and learning strategies differ according to researcher's approach to the subject. For example, while strategies described as self-regulation strategies correspond to the rehearsal (repetition) strategies (Leon-Guerrero, 2008) of Weinstein and Mayer (1986) classification, in some studies (Hallam, 2001a; Nielsen, 2001) these strategies correspond to comprehension monitoring (metacognition) strategies of Weinstein and Mayer (1986) classification.

When classification related to learning strategies are examined in studies in the field of music, it is seen that learning strategies sometimes discussed as characteristics include special behaviors and sometimes a combination of a set of behaviors. In addition to different classifications, learning strategies are generally gathered around certain strategies. However, Weinstein and Mayer's (1986) classification is generally recognized and used in many studies (Aicher, 1998; Aydıner-Uygun and Kılınçer, 2012a, 2012b; Kılınçer and Aydıner-Uygun, 2013a, 2013b; Nielsen, 1999a, 1999b, 2001).

The current study is based on Weinstein and Mayer (1986) classification of learning strategies. However, while some of the learning strategies (rehearsal, elaboration and organization) in Weinstein and Mayer (1986) classification are discussed in two separate groups, that is, basic and complex, no such separation has been made in this study. In addition to the classification made in this way, one of the sub-dimensions of learning strategies classification developed by Gagné and Driscoll (1988), attention strategies, are also included in the study. One of the strategies developed based on the theory of information processing is the attention strategies (O'Malley et al., 1988; Gagné and Driscoll, 1988; Senemoğlu, 2010; Öztürk, 1995; Subaşı, 2004). This is the reason why attention strategies are included in the study. Furthermore, just like in all learnings, it is believed that learning process in the learning of instrumental music starts with attention.

For the adaptation to the field of music, all the strategies categorized as cognitive by Weinstein and Mayer (1986) can also be used to phrase the psychomotor strategies. In fact, in order to conform to music's nature, there are some psychomotor behaviors expressed in items of the measurement tools used in related studies (Nielsen, 1999a, 1999b) based on Weinstein and Mayer's learning

strategies approach. Some of these items are playing parts with different tempos, playing each hand differently or together, systematically playing by changing the rhythmic structure of a part, playing only with one finger in a part, etc.

In this study, the concept of learning strategy is used in accordance with the definition given by Weinstein and Mayer (1986). According to Weinstein and Mayer (1986), learning strategies are thoughts and behaviors a learner engages in during learning that influences the learner's encoding process. Thus, the purpose of any learning strategy may be the way the learner reaches new information or behavior that he or she chose, obtained, organized or integrated. According to this interpretation, a strategy includes both thought and action. Strategy is not only a "pure" cognitive information process, but it also consists of different action types directed to the learning material.

According to the classification on which this study is based, learning strategies are divided into five groups: attention strategies, rehearsal strategies, elaboration strategies, articulation-organization strategies and comprehension monitoring strategies. Below, these strategies are briefly introduced and examples related to the practice and learning of instrumental music is given (Appendix 1 presented the status of these strategies in the scale).

Attention strategies

Learning activities start with the attention process. Attention is, in the broadest sense, socializing of a cognitive activity (Matlin, 1989). Attention is the most important process that ensures that the information necessary for an individual is transmitted to the short-term memory. For this reason, the first step in teaching is to attract student's attention and enhance it (Subaşı, 2004). Attention strategies allow the student to focus on cognitive activity by making markings on the material to be learned. Some of the examples of attention strategies used during the practice and learning of instrumental music are marking the instrumental music's tone/mode changes, marking the tempo or places of tempo changes, marking the speed and nuance terms, marking the difficult passages and marking the ornaments and explanations.

Rehearsal strategies

According to Weinstein and Mayer (1986), rehearsal is the learner effectively reading and counting the presented items during the learning. The purpose of this action is to choose and acquire the units to be transmitted to long-term memory. Rehearsal strategies are effective in acquiring the information through cognitive rehearsal

after determining what information is important or in making the information permanent. Consequently, rehearsal strategies are quite effective in learning the information that needs to be remembered (for example, poetry, composition, etc.). Some examples of the rehearsal strategies that can be used during the practice and learning of instrumental music are repetition of the entire music piece, the difficult passages or the parts where mistakes have been made on the instrument until the hand positions are easily done or cognitive rehearsal of the piece without playing an instrument until it can be easily played. However, to make learning permanent, learning strategies including higher-level cognitive actions are used. These actions may be possible with elaboration and articulation-organization strategies.

Elaboration strategies

Elaboration strategies enable students to understand the new information by activating their preexisting information, and to create analogies (Wernke et al., 2011). The purpose of elaboration strategies is to create links between the preexisting information or the information stored in the long-term memory and the information that is believed as important to remember. Successful learning includes establishing links between the preexisting information and the new information. The new information should be built on and linked with the previous information (Conford, 2002). An example of elaboration strategies that can be used during the practice and learning of instrumental music is establishing similarity and difference relationships between the tonal-modal, rhythmic and technical characteristics of the newly learned music and the tonal-modal, rhythmic and technical characteristics of the previously learned music.

Articulation-organization strategies

Articulation-organization strategies are among the ways to elaborate the material to be learned. Articulation strategies are the strategies that increase the meaning of the information and that increase the number of associations between the information and its parts (Senemoğlu, 1997). Organization strategies include grouping common characteristics between different examples in the learning material, sequencing the given words in a meaningful way and to reorganize complex information (Weinstein & Mayer, 1986). In other words, organization strategies involve transforming information into different forms and developing a schematic system between the parts (Cornford, 2002). Some of the examples of articulation-organization strategies that can be used during the practice and learning of instrumental music are concretization of abstract situations in music by, using visual markings or developing visual images in mind, attempting to visualize musical statements in mind,

encoding the codes that will make the music permanent, and grouping structures in music that show similarities or differences.

Comprehension monitoring strategies

Weinstein and Mayer (1986) point out that comprehension monitoring strategies involve students determining learning objectives in a learning activity, evaluating the extent to which these objectives are achieved and, when necessary, changing the strategies used to achieve these objectives. According to Pintrich (2004), comprehension monitoring strategies include students planning, supervising, regulating and changing their learning process. Some of the examples of comprehension monitoring strategies that can be used during the practice and learning of instrumental music are: thinking about the contributions of instrumental music on technical and musical development, using practice methods appropriate to music, identifying the reasons for difficulties that were encountered and developing methods to overcome these difficulties.

Study purpose

The purpose of this study is to develop a valid and reliable scale identifying the strategies students who study instrumental music use during the practice and learning of instrumental music based on their own responses. As a result of examining the related studies, it was believed that there was a need for a measurement tool focusing on attention, rehearsal, elaboration, articulation-organization and comprehension monitoring strategies as a whole. Studying the strategies used during the practice and learning of instrumental music requires the development of a valid and reliable scale. This necessity became the starting point of this study.

METHODOLOGY

This study is a scale development study employing the survey model. A descriptive item analysis, an exploratory factor analysis, and a scale's performance analysis were adopted. Research design is a descriptive item analysis since the study is about revealing the existing relationship between the items.

Study group

The study group comprised of 358 2nd, 3rd and 4th year undergraduate students studying music education in five Turkish universities in the 2015 to 2016 academic year. The students making up the study group were studying at Atatürk (n=62, 17.3%), Cumhuriyet (n=54, 15.1%), İnönü (n=64, 17.9%), Karadeniz Technical (n=93, 26.0%) and Necmettin Erbakan (n=85, 23.7%) universities. Fifty seven and three tenths of the students in the study group (n=205) are female and 42.7% (n=153) are male.

37.7% (n=135) of the students are 2nd year, 33% (n=118) 3rd year and 29.3% (n=105) 4th year students. In instrument courses, student learn to play bağlama (a Turkish instrument with three double strings) (n=59, 16.5%), cello (n=37, 10.3%), flute (n=58, 16.2%), guitar (n=50, 14%), violin (n=109, 30.4%), oud (n=24, 6.7%) and viola (n=21, 5.9%).

Procedure

In the study's procedure phase, first scale's candidate form was developed. For this purpose, items that need to be in the candidate form were decided upon after examination of related literature data regarding practice and learning strategies (Cangro, 2004; Chung, 2006; Green, 2012; Hagans, 2004; Hallam 2001a, 2001b; Kılınçer and Aydıner-Uygun, 2013a; Leon-Guerrero, 2008; McCormick and McPherson, 2003; Nielsen 1999a, 1999b, 2001, 2004, 2008; Pitts and Davidson, 2000; Santos and Gerling, 2011; Sikes, 2013).

After developing the candidate form, the validity and reliability were established ensured. Reliability is the degree to which an assessment tool produces stable and consistent results. Types of reliability are test-retest, parallel forms, inter-rater and internal consistency. Internal consistency is used in this study. Validity refers to how well a test measures what it is purported to measure. Types of validity are face validity, criterion-related validity, construct validity, formative validity and sampling validity. Construct validity is used in this study.

Expert opinions were sought for the scale's content validity. One of the experts is an expert in the field of measurement and evaluation from Gazi University (Ankara, Turkey). The other two are experts in the field of music education from Ömer Halisdemir University (Niğde, Turkey). To determine the scale's validity and reliability of the scale a pre application was conducted with the 358 students making up the study group.

For the validity of the scale, the candidate form consisting of 55 items was presented to experts. In accordance with the expert opinions, one item was excluded from the scale because it was inadequate to measure the related structure; five items were excluded because they were not clear enough. Thus, content validity for 49-item scale was met. The 49-item scale was reproduced on paper and administered to the students making up the study group. The scale's structural validity and reliability analyses were conducted through 358 observations.

Comrey and Lee (1992) characterized a sample size of 100 as poor, 200 as fair, 300 as good, 500 as very good and 1000 or more as excellent. Guilford (1954) suggested that sample size should be at least 200. Tavşancıl (2002) expressed that the number of items should be between five items and ten items. Based on the aforementioned, it can be said that the sample size in this scale development study is appropriate.

Research and data analysis

Exploratory Factor Analysis (EFA) was administered for the structural validity of the scale. The factor analysis is one of the methods used for transforming correlated data structures to new independent and less data structures, for presenting common factors by grouping variables that are supposed to explain a phenomenon or event and for grouping variables influencing a phenomenon (Özdamar, 2002). Some hypothetical criteria must be sought in factor analysis studies. The suitability of the data for factor analysis was examined with Kaiser-Meyer-Olkin (KMO) coefficient and Barlett sphericity tests. For the suitability to be met, KMO value should be higher than .60 and the chi-square value calculated for the Barlett sphericity test should be statistically significant (Büyüköztürk, 2008).

RESULTS AND DISCUSSION

This section includes the results obtained from the structural validity and reliability of the Scale for Strategies used during the practice and learning of instrumental music.

Results obtained from the scale's structural validity analysis

In the study, sample adequacy coefficient (KMO) was found to be 0.93, and χ^2 value of Barlett sphericity test was found to be 9720.93 (p<.001). These results show that the data is suitable for factor analysis. Then, Varimax rotation AFA was applied to the 49-item scale and the items (i7, i14, i15, i22, i24, i29 and i36) with factor loads below 0.40 were excluded.

After this process, factor analysis was applied again. In the second application, items (i23, i33 and i34) in more than one factor were excluded and factor analysis was repeated for a third time. As a result of the last application, it is seen that factor loads were above 0.40 and the scale has five sub-dimensions (Table 1 and Figure 1). The exploratory percentage of the total variance of this five sub-dimensioned structure was found to be 60.3%. Table 1 shows the scale's distributions of the factor loadings. Table 2 presents the exploratory and item distributions of the scale's dimensions, and Figure 1 shows the eigenvalues of the scale's sub-dimensions

Results obtained from the scale's reliability and item analysis

The distribution of reliability coefficients according to the scale's sub-dimensions is presented in Table 3. As can be seen in Table 3, the reliability coefficients of the scale and its sub-dimensions were found to be high. Distributions of the scale's item analysis are given in Table 4. In Table 4, it is seen that *corrected item-total correlations* are above 0.30. Based on the results, it can be concluded that the five-dimensioned scale meets the validity and reliability criteria.

CONCLUSION

This study was aimed to develop a scale for strategies used during the practice and learning of instrumental music. The type of the scale can be described as self-assessment scale. Developed to determine strategy levels individuals use during the practice and learning instrumental music, the scale is a measurement tool based on individuals giving information about themselves. The scale includes attention, rehearsal, elaboration, articulation-organization and comprehension monitoring dimensions. There are a total of 39 items in the scale.

Table 1. Scale's distribution of factor loads on the scale.

Item	Dimension				
	1	2	3	4	5
i1	0.717	-	-	-	-
i2	0.811	-	-	-	-
i3	0.813	-	-	-	-
i4	0.799	-	-	-	-
i5	0.747	-	-	-	-
i6	0.707	-	-	-	-
i8	0.513	-	-	-	-
i9	-	0.721	-	-	-
i10	-	0.745	-	-	-
i11	-	0.528	-	-	-
i12	-	0.711	-	-	-
i13	-	0.711	-	-	-
i16	-	-	0.652	-	-
i17	-	-	0.734	-	-
i18	-	-	0.730	-	-
i19	-	-	0.640	-	-
i20	-	-	0.677	-	-
i21	-	-	0.703	-	-
i25	-	-	-	0.647	-
i26	-	-	-	0.697	-
i27	-	-	-	0.706	-
i28	-	-	-	0.778	-
i30	-	-	-	0.638	-
i31	-	-	-	0.657	-
i32	-	-	-	0.675	-
i35	-	-	-	-	0.614
i37	-	-	-	-	0.647
i38	-	-	-	-	0.637
i39	-	-	-	-	0.717
i40	-	-	-	-	0.616
i41	-	-	-	-	0.639
i42	-	-	-	-	0.740
i43	-	-	-	-	0.679
i44	-	-	-	-	0.668
i45	-	-	-	-	0.612
i46	-	-	-	-	0.725
i47	-	-	-	-	0.717
i48	-	-	-	-	0.557
i49	-	-	-	-	0.770

There are seven items in the attention strategies dimension, five in rehearsal strategies dimension, six in elaboration strategies dimension, seven in articulation-organization strategies dimension, and 14 in comprehension monitoring strategies dimension. Consisting of 39 items and showing a five-dimensional structure, the scale's total variance was 60.3%.

In multi-factor scales, the explained variance is expected to be higher than 30%. Higher explained variance is interpreted as an indication of how well the related concept or structure is measured (Büyüköztürk, 2008). In this respect, it can be said that the scale is adequate in differentiating the individuals in measuring the related structure. The factor loading values of the items in the scale ranges from 0.513 to 0.813. The fact that factor loading values of the items in the scale are
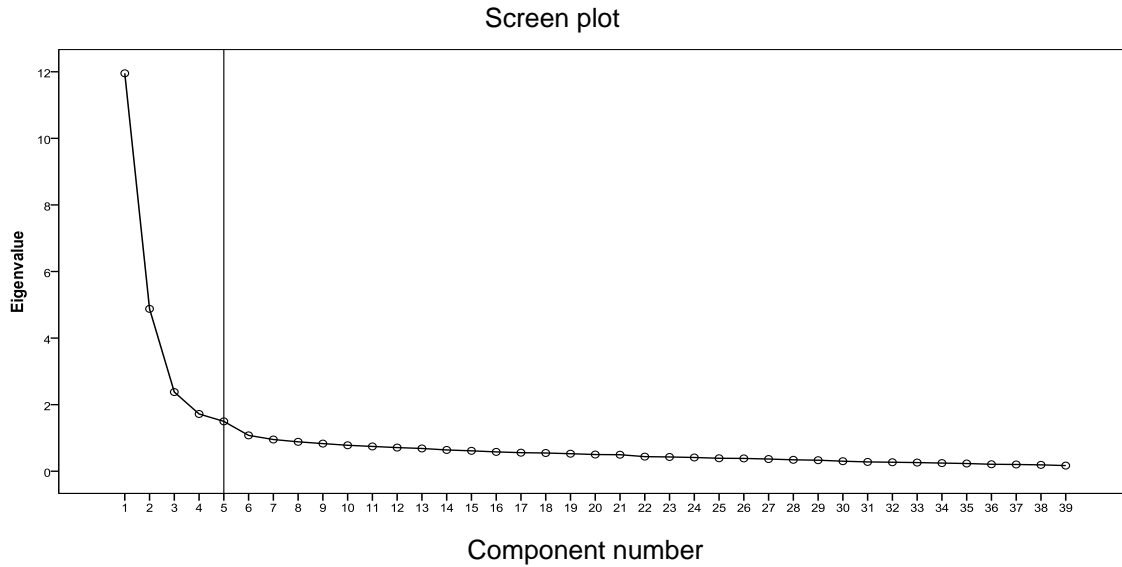
Screen plot

Figure 1. Eigenvalues for the scale's sub-dimensions.

Table 2. Exploratory and item distributions of the scale's dimensions.

Explanation	Item number	Items
Attention strategy	7	i1, i2, i3, i4, i5, i6, i8
Rehearsal strategy	5	i9, i10,i11, i12, i13
Elaboration strategy	6	i16, i17, i18, i19, i20, i21
Articulation-organization strategy	7	i25, i26, i27, i28, i30, i31, i32
Comprehension monitoring strategy	14	i35, i37, i38, i39, i40, i41, i42, i43, i44, i45, i46, i47, i48, i49

Table 3. Reliability coefficients of the dimensions.

Dimension	Item number	Reliability coefficients
Attention strategy	7	0.89
Rehearsal strategy	5	0.81
Elaboration strategy	6	0.85
Articulation-organization strategy	7	0.87
Comprehension monitoring strategy	14	0.93
Total	39	0.94

higher than 0.45 indicates that these items should be kept in the scale (Kline, 2000).

Reliability coefficients for the scale's sub-dimensions were found to be 0.89 for attention strategies dimension, 0.81 for rehearsal strategies dimension, 0.85 for elaboration strategies dimension, 0.87 for articulation-organization strategies dimension and 0.93 for comprehension strategies dimension. There are no reverse-coded items in the scale. The information regarding the strategies the individual use during the practice and learning instrumental music can be obtained by dividing the total score from the scale by the item number (39).

RECOMMENDATIONS

It is believed that the scale will be a powerful tool for researchers in explaining the levels of strategies students use during the practice and learning of instrumental music.

Table 4. Distributions of scale's item analysis.

Item	Item-total statistics			
	Scale average when item is excluded	Scale variance when item is excluded	Corrected item-total correlation	Cronbach alpha value when item is excluded
i1	18.59	34.702	0.676	0.874
i2	18.66	34.320	0.770	0.863
i3	18.74	35.021	0.748	0.866
i4	18.73	34.893	0.731	0.868
i5	18.76	34.570	0.711	0.870
i6	18.86	35.058	0.691	0.872
i8	18.13	38.413	0.470	0.898
i9	20.17	10.687	0.615	0.721
i10	20.16	10.547	0.643	0.714
i11	20.54	11.073	0.451	0.764
i12	20.08	10.697	0.652	0.713
i13	20.22	10.994	0.557	0.736
i16	20.65	12.190	0.381	0.776
i17	13.87	13.121	0.708	0.766
i18	13.79	13.442	0.651	0.780
i19	13.84	11.951	0.527	0.832
i20	13.82	13.628	0.608	0.791
i21	13.96	12.836	0.662	0.775
i25	17.98	32.417	0.633	0.856
i26	18.04	31.365	0.701	0.846
i27	18.05	32.524	0.637	0.855
i28	18.37	31.387	0.650	0.854
i30	17.83	33.936	0.610	0.859
i31	17.77	33.163	0.664	0.852
i32	17.71	33.356	0.660	0.853
i35	50.11	95.541	0.596	0.921
i37	50.17	93.374	0.684	0.918
i38	50.17	94.063	0.635	0.920
i39	50.20	92.667	0.697	0.918
i40	50.36	94.181	0.610	0.921
i41	50.29	93.648	0.649	0.919
i42	50.11	93.086	0.709	0.917
i43	50.03	94.932	0.640	0.920
i44	50.01	94.457	0.625	0.920
i45	50.10	94.466	0.615	0.921
i46	50.03	93.212	0.715	0.917
i47	50.15	92.411	0.727	0.917
i48	50.23	95.156	0.549	0.923
i49	50.18	91.927	0.730	0.917

Also, it can be used as an observation tool by teachers to measure their students' levels of practice and learning strategies. Through this scale, teachers can take measures to increase the diversity of their students' strategy use. They can experience which strategies are effective under which conditions on which student style.

This scale can also be considered as a measurement tool for researchers to use in their experimental studies.

For this, it is important to repeat the scale's validity and reliability works by employing the scale to different sample groups. It is also important to perform confirmatory factor analysis to confirm the factor structure. In future studies, a confirmatory factor analysis of the present scale with another related scale developed earlier (Kılınçer and Aydıner-Uygun, 2013a) can be performed in order to confirm the present scale's factor

structure.

In addition, the relations between the present scale and valid and reliable scales (Aydıner-Uygun, 2012; Aydıner-Uygun, 2016; Miksza et al., 2016) that measure structures related with practice and learning strategies (learning approach in instruments, achievement goal orientation in instrument) can be examined. Using this scale, scale's measurement power can be tested through future studies.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Appendix 1. Scale for strategies used during the practice and learning of instrumental music (Coding 1: Never, 2: Seldom, 3: Sometimes, 4: Often, 5: Always).

S/N	Items	1	2	3	4	5
1	I mark instrumental music's tone-mode/tone-mode changes					
2	I mark instrumental music's tempo/places of tempo changes					
3	I mark the tempo terms found in instrumental music					
4	I mark the nuance terms found in instrumental music					
5	I mark the places of ornaments like mordan, trill and grupetto in instrumental music					
6	I underline explanations about practice of ornaments like mordan, trill and grupetto in instrumental music					
7	I mark the difficult passages of instrumental music					
8	I rehearse the *entire* instrumental music piece on my instrument until I gain a certain *ease in playing*.					
9	I rehearse the instrumental music's *difficult passages* on my instrument until I gain a certain *ease in playing* by determining the difficult passages.					
10	I rehearse the *notes* of entire instrumental music piece or a part of it visually in my mind					
11	I constantly rehearse the places where I made mistakes in instrumental music on my instrument until I can play them correctly					
12	I cement the hand positions found in instrumental music by constantly playing them					
13	I establish similarity relationships between the techniques of instrumental music and the techniques of instrumental music I have learned previously					
14	I establish difference relationships between the techniques of instrumental music and the techniques of instrumental music I have learned previously					
15	I establish similarity relationships between the rhythmic characteristics of instrumental music and the rhythmic characteristics of instrumental music I have learned previously					
16	I establish difference relationships between the rhythmic characteristics of instrumental music and the rhythmic characteristics of instrumental music I have learned previously					
17	I establish similarity relationships between the tonal/modal characteristics of instrumental music and the tonal/modal characteristics of instrumental music I have learned previously.					
18	I establish difference relationships between tonal/modal characteristics in the study/piece and the tonal/modal characteristics in the study/piece I have learned previously					
19	I concretize abstract information, concept and situations for me in instrumental music by using visual markings.(For ex. Drawing a triangles where there are trioles, using symbols for ligature beginnings and endings)					
20	I concretize abstract information, concept and situations for me in instrumental music by developing visual images in my mind. (For ex. To visualize a turtle's walk for the term lento)					
21	I try to create a short story by visualizing the statement in instrumental music in my mind					
22	I code certain note groups in instrumental music with a phrase or a sentence to make them permanent in my mind.					
23	I learn the notes of instrumental music by grouping them according to their movement directions.					
24	I learn melodic/harmonic structures moving with similar intervals in instrumental music by grouping them					
25	I learn the rhythmic patterns of instrumental music by grouping them according to their similarities/differences					
26	I can guess how difficult it would be for me to play a new instrumental music when I see it for the first time					
27	I think about the gains instrumental music will bring to my technical development					
28	I think about the gains instrumental music will bring to my musical development					

Appendix 1. Cont'd

29	I ask questions about how I can play instrumental music better
30	I determine different practice methods appropriate to instrumental music
31	I search for new methods when the methods I use for the practice of instrumental music do not succeed
32	I learn how I should practice for a new instrumental music and I practice accordingly
33	I realize the mistakes I make while practicing instrumental music
34	If I cannot play instrumental music right, it is because I did not practice enough
35	I determine the difficulties I face with instrumental music. (For ex. Using wrong finger numbers, technical and rhythmic difficulties, etc.)
36	I try to answer questions like what can I do to overcome the difficulties in instrumental music, how can I play better and how can I correct the places where I make mistakes)
37	I try to overcome technical difficulties of instrumental music by practicing technical difficulties
38	I make my friend and my teacher listen to my instrumental music performance or I listen to myself by recording it
39	I question why I could not learn if I realize I did not learn what I needed to learn as a result of my instrumental music practice

*Attention Strategies: 1-7; **Rehearsal Strategies: 8-12; ***Elaboration Strategies: 13-18; ****Articulation-Organization: 19-25; *****Comprehension Monitoring Strategies: 26-39.

Full Length Research Paper

Identifying the concept "fraction" of primary school students: The investigation in Vietnam

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In Vietnam, primary school students explicitly learn the concept of fraction in Grade 4 and 5. Because this concept is introduced to them intuitionally, it is difficult for them to understand and apply it. Base on this point, we believe that the students will commit many errors when solving exercises related to this concept. The survey of 478 students showed that some remarkable errors were made by most students; when learning fractions, students still did not understand the nature of fractions as well as the equality of parts. Therefore, teachers should note the errors of students, and use the effective pedagogical measures to help them prevent, and correct the errors.

Key words: Fraction, teaching and learning fraction, mathematics in primary schools, mathematics education.

INTRODUCTION

The research papers of fractions were made by a lot of researchers around the world. Some authors showed that students find it difficult to understand fraction concepts. Stafylidou and Vosniadou (2004) tested 200 students by using a questionnaire to investigate the development of their understanding of the numerical value of fractions. The two researchers asked them to decide on the smallest/biggest fraction, to order a sequence of fractions, and to explain their answers. The results showed that students did not adopt the scientific concept of the fractions immediately. In particular, they gave their answers revealing their misconceptions. Prediger (2006) investigated students' difficulties with fractions in German schools. Most

students wrongly found that multiplication makes it bigger.

Furthermore, they found it unacceptable to multiply a fraction by another. The reason for these misconceptions was that students were influenced by the knowledge of natural numbers. A survey of difficulties related to fractions in Primary School Leaving Examination was carried out by Ndalichako (2013).

The findings indicated that a large number of candidates were unable to do the operations with fractions because of their confusion of fractions with natural numbers. Indeed, they tended to treat numerators and denominators as separate entities. The reasons for these difficulties were lack of

understanding of appropriate procedures to apply in solving a problem, the complexity of the tasks and over-generalization of procedures even in situations. In addition, the author proposed some relevant teaching methods to facilitate meaningful learning of fractions.

Besides, works related to the difficulties of students in learning fractions, many researchers studied the students' errors related to fractions. Lukhele et al. (1999) had a specific investigation of errors of students when they did the addition of fractions. The reasons for these errors were a weak understanding of the fraction concept, a very common limiting construction arising from learners' experience with whole numbers and the set algorithms which are taught for whole number arithmetic. The results of the study highlighted the fact that wrong strategies for adding fractions were applied by most students. Also, the researchers suggested some ways to deal successfully with the addition of fractions without grasping at rules and algorithms. Two Bruneian authors, Yusof and Malon (2003) carried out an interesting study of students' errors in the use of fractions. The main result was that five common kinds of errors were committed by 396 pupils in primary schools in Brunei. The researchers also pointed out the reasons for those errors.

For example, students' prior knowledge of learning natural numbers had a negative influence on their understanding of fractions and their operations. Moreover, they had lack of not only the basic knowledge but also the skills to do operations with fractions. Idris (2011) found out some kinds of errors made by 80 students in a secondary school in Malaysia when they did the operations of addition and subtraction of fractions.

In this study, three identified errors were careless errors, negligence errors and systematic random errors. More specifically, some students had problems such as: converting to the lowest common denominator, understanding fractions and dealing with improper fractions.

In order to increase the effectiveness of teaching fractions, several authors developed strategies for teaching fraction concepts. Amato (2005) proposed some ways to help students to understand fractions as an extension to the number system. As a result, it was very beneficial for students to use multiple representations for fractions equal to one unit and mixed numbers. Nicolaou and Pitta-Pantazi (2012) developed a new model for understanding fractions in primary schools including six factors: inductive reasoning, explanations, justifications, conception for the magnitude of fractions, representations and connections with other concepts. The results helped the researchers to verify the factors' effectiveness of understanding fractions very well.

Khairunnisak et al. (2011) applied theory of Realistic Mathematics Education to support fifth Grade students in Learning Multiplication of Fraction with Whole Number. The results showed that the learning process starts with the students discovering the contextual situation of fair division, where students extend their understanding of fraction concept associated with division and multiplication. Reimer and Moyer (2005) used virtual manipulatives to teach fractions to 19 third-grade students. They offered students opportunities to interact with several virtual manipulative applets in a computer lab. The results indicated that the virtual manipulatives:

1. Helped these students learn more about fractions by providing immediate and specific feedback
2. Were easier and faster to use than paper-and-pencil methods, and
3. Made students more interesting while learning mathematics.

Elisabet et al. (2012) showed that the early fraction learning is not just about shading some parts on any shape. Solving problems in contextual situations related to fractions helps students develop their understanding of the meaning of fractions.

In mathematical curriculum of primary schools in Vietnam, students study the topic "fraction" in Grade 4 and 5, in particular, the main contents of fraction are sufficiently mentioned in the textbook "Mathematics 4" (Toán 4) (Hoan, 2007a) , and reviewed in the textbook "Mathematics 5" (Toán 5) (Hoan, 2007b).

In the textbooks, the concept of fraction is defined as the number of equal parts of a whole. The students learn the concept through observing the picture of a circle divided into 6 equal parts in which 5 parts are colored in the same color, it is said that 5 over 6 of the circle is called a fraction (Figure 1). From this, a problem is posed: Is this approach beneficial for students to comprehend this concept? Moreover, before students learn fractions, they have to work with natural numbers for a long time.

Therefore, it is sure that they will be influenced by the previous knowledge when learning new knowledge. Also, operations with fractions are rather sophisticated. The second problem is: When doing operations with fractions, do they make errors? In Vietnam, they have been problems not to be done research before. From the aforementioned problems, five questions are formulated as follows:

Research question 1: In the fraction (1), the whole must be divided into **b** equal parts and take away a parts. However, in the case of the whole divided into **b** unequal parts and taken a unequal parts, do students still say that this is a fraction (2)?

Research question 2: In case, a whole is divided into **b** equal parts shaded in various colors, do the students identify the corresponding fractions?

Table 1. Grades in the survey.

Name of grades	Name of primary schools	City / Province
4A1, 4A4, 5A1, 5A2, and 5A3	Trung Hung 1	Co Do, Can Tho city
4A and 4C	Vo Truong Toan	Ninh Kieu ward, Can Tho city
4B and 5.7	Phan Boi Chau	Ninh Kieu ward, Can Tho city
5E	Mac Dinh Chi	Ninh Kieu ward, Can Tho city
5B	Cai Khe 1	Ninh Kieu ward, Can Tho city
5C and 5D	Vinh My	Vinh Chau district, Soc Trang province
5/3	Tan Long 2	Nga Nam county town, Soc Trang province

Research question 3: Do students meet difficulties when they add two fractions in the case of the two fractions represented by images?

Research question 4: In dividing two fractions, do students strongly believe that it is not correct to divide the numerator of the first one by the numerator of the second one, and the denominator of the first one by the denominator of the second one?

Research question 5: Because of the impact of adding natural numbers, are students wrong to add two fractions as follows: the numerator of the first one plus the numerator of the second one, and the denominator of the first one plus the denominator of the second one?

The study aim is to provide answers to the aforementioned questions. The results obtained will help us to recognize the limitations of how to introduce the concept of fraction in textbooks, and to know Vietnamese students 'difficulties and errors committed; this will be a useful lessons for us and primary school teachers of Vietnam to increase the quality of teaching mathematics in the primary school...

METHODOLOGY

Participants

Participants were students from 5 grades 4 and 10 grades 5 in primary schools of provinces in Mekong Delta – Vietnam (Table 1). The sum of students in 15 grades was 478. Also, they studied the contents of the fractions, the properties as well as calculations with fractions. This took place from January, 2016 to March, 2016.

Questions constructed for testing students

In order to find out students' answers to the aforementioned research question, we constructed five questions (as below) for students to complete them within 15 min. Table 2 indicated the objectives of each question.
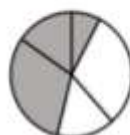
Questions for testing students

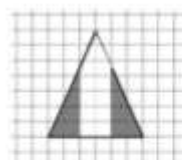**Question 1**. (for the research question 1)

Fill in the blank with T (True) or F (False)

a. Fraction indicating the colored parts in the circle is $\frac{2}{5}$ □

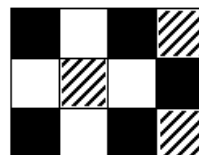b. Fraction indicating the colored parts in the circle is $\frac{3}{7}$ □

c. Fraction indicating the crossed parts in the triangle is $\frac{2}{3}$ □

d. Fraction indicating the crossed parts in the rectangle is $\frac{3}{4}$ □

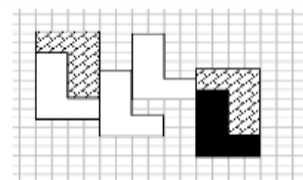**Question 2**. (for the research question 2)

Fill out the appropriate fractions to place dots.

a.

The rectangle includes all 12 squares alike.

- Fraction which indicates the black parts is......
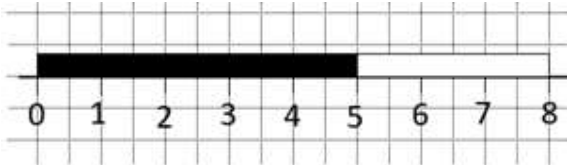- Fraction which indicates the white parts is......

b.

Table 2. The objectives of questions used to test students.

| Objective of question	Students' ability to identify "fraction" given by images	Students' ability to identify "fraction" and do "+" operation "fraction" given by images	Students' ability to identify of correction of "x" and ":" operations
Question	Question 1; question 2	Question 3	Question 4; question 5

The earlier shown shape includes all 6 L- shaped blocks alike.

Fraction which indicates the crossed parts is……

c.

Fraction which indicates the black parts in the above shape is……

Question 3. (for the research question 3)

a. The crossed parts of the pictures H1 and H2 represent fractions. Let's represent the sum of the two fractions on the picture H3 by crossing out.

H1   H2   H3
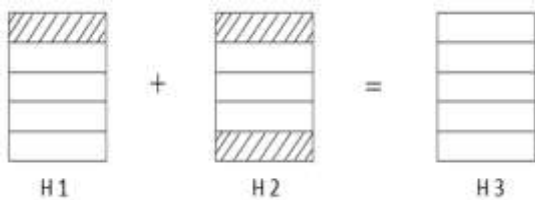
b. The colored parts of the pictures H4 and H5 represent fractions. Please fill out the appropriate fractions to place dots.

H4   H5
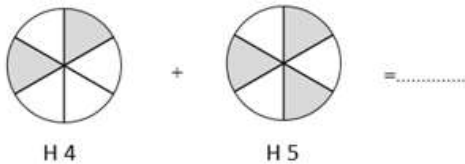
Question 4. (For the research question 4)

Fill in the blank with T (True) or F (False)

a. $\frac{35}{12} : \frac{5}{6} = \frac{7}{2}$ ☐

b. $\frac{22}{9} : \frac{2}{3} = \frac{11}{3}$ ☐

c. $\frac{7}{3} : \frac{4}{9} = \frac{21}{4}$ ☐

d. $\frac{15}{8} : \frac{5}{4} = \frac{3}{2}$ ☐

e. $\frac{5}{6} : \frac{2}{5} = \frac{25}{12}$ ☐

Question 5. (For the research question 5)

Fill in the blank with T (True) or F (False)

a. $\frac{9}{8} + \frac{2}{7} = \frac{11}{15}$ ☐

b. $\frac{3}{2} + \frac{5}{2} = 4$ ☐

c. $\frac{6}{7} + \frac{5}{6} = \frac{11}{13}$ ☐

d. $\frac{5}{2} + \frac{5}{7} = \frac{5}{9}$ ☐

e. $\frac{3}{7} + \frac{5}{7} = \frac{8}{7}$ ☐

Initial comments of questions

This section includes our intentions of each question posed to the student, the basis of the questions raised, the correct answers to the questions as well as our predictions of the answers of students

For question 1

We want to know the answer of the question: Do students consider the parts of a whole as fractions, if they are divided in the whole unequally? In the process of teaching, if teachers do not inadvertently give attention to students about the "equality of the chosen parts", it is likely that students will not realize this. Therefore, we think that students are very easy to make mistakes in identifying the unequal parts. Here are purposes of items and the correct answers to the question (Table 3):

(1) Item a: we propose a correct item, and it is very familiar to students as background for the following items.

(2) Item b: we divided the circle with the unequal parts. Clearly, we found that the fraction of the colored parts is smaller than $\frac{3}{5}$, (3) and that of the remaining parts is smaller than $\frac{0.5}{5}$ (4).

(3) Item c: we can easily say that the fraction of the crossed parts is smaller than $\frac{2}{3}$ (5) because that of the white parts is larger than $\frac{1}{3}$ (6). By counting the numbers of squares, students find that the white parts are not equal to the crossed parts.

(4) Item d: It is very clear and intuitive for students to know that the white triangular part is equal to the crossed part (Table 3).

For question 2

We want to check if the students have to find the essence of

Table 3. The correct answers to the question 1.

Items	a	b	c	d
Correct answer	T	F	F	T

the fractions or not when they are presented in an unfamiliar shape. For the concept of fractions in mathematical textbooks, they are often introduced by the whole divided into equal parts, and the colored or taken parts. In reality, the taken parts are usually colored in the same color. In our shape, the parts are black, white and cross. In this case, it can cause more obstacles for students greatly in identifying the fractions correctly. The reason for this is that students will find it confused to determine denominators.

Item a:

Possible strategies:

Strategy 1 (S1): (Correct answer)

There are five black cells of 12 cells, the fraction which indicates the black cells is $\frac{5}{12}$ (7). Meanwhile, there are five white cells of 12 cells, the fraction which indicates the white cells is $\frac{7}{12}$ (8)

Strategy 2 (S2): (Incorrect answer)

Students take five black cells as the numerator, then take the total number of white cells as the denominator, and they write $\frac{5}{7}$ (9)

Strategy 3 (S3): (Incorrect answer)

Wrong answers may be $\frac{5}{12}; \frac{4}{7}$ (10). The reason for this answer is that students ignore five black cells.

Strategy 4 (S4):

Students can raise some fractions to complete assignments. For example, they are $\frac{4}{12}; \frac{3}{12}; \frac{3}{10}; \frac{4}{12}$ (11)

Item b:

Possible strategies:

Strategy 1 (S1): (Incorrect answer)

The students' answer may be $\frac{2}{3}$ (12). They may consider the numbers of crossed L-shapes as the numerator and the numbers of white L-shapes as the denominator.

Strategy 2 (S2): (Correct answer)

The right answer is $\frac{2}{6}$ (13) due to correctly identifying the chosen parts of a whole.

Strategy 3 (S3): (Incorrect answer)

The wrong answer may be $\frac{2}{4}$ (14). The explanation of students is: The numerator is the number of slashed L-shapes, the denominator is the number of remaining L-shapes.

Strategy 4 (S4):

Students can raise some fractions to complete assignments.

Item c:

Possible answers:

The aim of item c is to answer the question: "Do students identify fractions as they are expressed in linear approach?" Some answers of the students:

$\frac{5}{8}$ (15). Students identify the fraction correctly.

The answers are different from $\frac{5}{8}$ (16), so the linear approach to fractions is difficult for students.

For question 3

We want to test students on adding two fractions. Particularly in the item a, we also require them to express the sum of two fractions in the "shape" form. Typically, the exercises on adding fractions are presented and designed by two fractions written in symbols explicitly. Adding fractions illustrated by shapes does not appear in the mathematical textbooks.

However, if students understand the nature of the fractions and the rule of adding two fractions, the calculation of adding two fractions (illustrated by shapes) is not much different than that of the two fractions denoted and illustrated by fractional symbols. Besides, we think that this question can form creative thinking for students because it has multiple right solutions. Some possible answers:

(1) Students calculate the sum of two fractions by crossing out 3 parts in 5 parts.

(2) Because students do not know how to calculate the sum of two fractions, they have a vacant or wrong answer.

For question 4

Normally, teachers present the rule of dividing two fractions very carefully. For example, "To divide two fractions, we multiply the first fraction by the reciprocal of the second fraction". Because

Table 4. The correct answers to the question 4.

Items	a	b	c	d	e
Correct answer	T	T	T	T	T

Table 5. The correct answers to the question 5.

Items	a	b	c	d	e
Correct answer	F	T	F	F	T

influenced by this rule, students will say that it is incorrect to divide two fractions by dividing the two numerators together, and the denominators together. Table 4 presented the correct answers to the question 4. Two possibilities may occur:

Possibility 1: Students give five correct answers. Possibility 2: Students give five wrong answers.

Question 5

We want to test whether students add fractions as natural number or not. In fact, in the item d, we want to know if they add the two denominators and keep the numerators unchanged or not. There are two correct rules of adding fractions in the mathematical textbooks as below:

Rule 1: In order to add two fractions with a common denominator, we add the two numerators and keep the denominators unchanged.
Rule 2: In order to add two fractions with different denominators, we make them have a common denominator, then do the addition.

For teachers, there is nothing difficult, but for students in primary schools, because they are thoroughly conversant with adding two natural numbers, their knowledge of adding two fractions may be similar to that of adding two natural numbers. In an inertial way, that the students add two fractions as natural numbers is entirely probable. Table 5 presented the correct answers to the question 5.

RESULTS AND DISCUSSION

The salient result in Table 6 was that 98% of students had correct answers in the item a because of their familiarity with the equal parts of fractions. In addition, Table 1 also showed that many students did not pay attention to the condition of "equal parts" to identify the concept of fraction, namely a lot of students came up with the wrong answers (40% in the item b and 67% in the item c). Besides, in the item d, many students were not concerned about the equality of parts, in particular, the white triangle parts were not equal with rectangular crossed parts (accounted for 28.5%).

Specially, a student did have no right answers. This made us very surprised. Moreover, there were 2 students with 0.4% respectively having no answers in

Table 6. Students' answers to question 1.

Items	Answers	% of students
a	Correct	469/478 (98)
	Incorrect	9/478 (2)
b	Correct	289/478 (60)
	Incorrect	189/478 (40)
c	Correct	156/478 (32.6)
	Incorrect	320/478 (67)
	No answer	2/478 (0.4)
d	Correct	340/478 (71.1)
	Incorrect	136/478 (28.5)
	No answer	2/478 (0.4)

both items c and d. Those results allowed us to assert that in the case of the
whole divided into **b** unequal parts and taken **a** unequal

parts, students still say that this is a fraction $\frac{a}{b}$ (17).
According to Table 7, the right strategies for item a (S1) and b (S2) were chosen by a lot of students, respectively as follows:

292/478 (61%) and 339/478 (71%).

This showed that many students recognized fractions expressed by many factors. However, there were also quite a lot of students who did not know how to identify fractions. The students' answers were given as follows:

(1) $\frac{3}{5} \frac{4}{5}$ (18). Students found that the slashed part was the numerator and the denominator was the black part, while the numerator was the crossed part, the denominator was the white part.

(2) $-\frac{5}{3} \frac{5}{4}$ (19). Students acted in a similar way to the above case.
When there were many factors in the whole, they faced embarrassment in determining the numerator as well as the denominator, then led to the misidentification of fractions.
(3) 5, 4: The incorrect answers of students were two natural numbers, while the request was writing fractions. In this case, because the students could not determine denominators, they only wrote the numerators. When students did not choose the right strategy, they considered S4 as an answer. The most obvious result in the survey was 185/478 (40%) of students who chose this strategy.

In general, 70% of students gave the right strategy. Therefore, we concluded that in the case of whole

Table 7. Students' answers to question 2.

Items	Answers		% of students
a	Strategies	S1	292/478 (61)
		S2	1/478 (0.2)
		S3	0/478 (0)
		S4	185/478 (38.8)
	Correct		292/478 (61.1)
	Incorrect		182/478 (38.1)
	No answer		4/478 (0.8)
b	Strategies	S1	0/478 (0)
		S2	339/478 (71)
		S3	18/478 (4)
		S4	121/478 (25)
	Correct		339/478 (71)
	Incorrect		133/478 (27.8)
	No answer		6/478 (1.2)
c	Correct		367/478 (76.8)
	Incorrect		103/478 (21.5)
	No answer		8/478 (1.7)

Table 8. Students' answers to question 3.

Items	Answers	% of students
a	Correct	436/478 (91)
	Incorrect	16/478 (4)
	No answer	26/478 (5)
b	Correct	213/478 (44.6)
	Incorrect	218/478 (45.6)
	No answer	47/478 (9.8)

divided into **b** equal parts shaded in various colors, the students could identify the corresponding fractions.

According to Table 8, we found that there was a big difference in the percentages of students between items a and b. Indeed, the percentages of students giving the correct answers in both item a and b were 91 and 44.6%. The reason for this was easily understood as follows:

When asked to present a total of two fractions illustrated by shapes, many students came up with the right solutions.

Sometimes, students looked visually through the shapes, then represented a fraction of the total shape, but they still did not understand. Specifically, students could choose the strategy represented: Because the shape 1 has one part crossed out, and the shape 2 has two parts crossed out, they crossed out three parts in the shape 3 in an inertial way.

This could be clearly explained in the item b, and many students made a mistake because in the item b, this could not happen. In short, students met difficulties when they add two fractions in the case of the two fractions represented by images.

According to Table 9, the percentage of students giving the wrong answers to item a, b and d was nearly 50% (54%, 53% and 51%) and item d was 74%. When the students observed fractional division which took the numerator (the first fraction) divided by the numerator (2nd fraction) and the denominator (the first fraction) divided by the denominator (2nd fraction), they immediately said that it was wrong. Hence, there were some very careful students, so they checked again the

Table 9. Students' answers to question 4.

Items	Answers	% of students
a	Correct	222/478 (46)
	Incorrect	255/478 (54)
	No answer	6/478 (5)
b	Correct	222/478 (46)
	Incorrect	251/478 (53)
	No answer	5/478 (1)
c	Correct	117/478 (25)
	Incorrect	355/478 (74)
	No answer	6/478 (1)
d	Correct	229/478 (48)
	Incorrect	242/478 (51)
	No answer	7/478 (1)
e	Correct	359/478 (74)
	Incorrect	119/478 (25)
	No answer	7/478 (1)

Table 10. Students' answers to question 5.

Items	Answers	% of students
a	Correct	309/478 (65)
	Incorrect	169478 (35)
	No answer	6/478 (1)
b	Correct	186/478 (39)
	Incorrect	283/478 (59)
	No answer	9/478 (2)
c	Correct	312/478 (65)
	Incorrect	157/478 (33)
	No answer	9/478 (2)
d	Correct	394/478 (82)
	Incorrect	74/478 (16)
	No answer	10/478 (2)
e	Correct	385/478 (81)
	Incorrect	84/478 (17)
	No answer	9/478 (2)

results by doing fractional division based on the rule in the mathematical textbooks.

At this point, it was reasonable to say that in dividing two fractions, students strongly believe that it is not correct to divide the numerator of the first one by the numerator of the second one, and the denominator of the first one by the denominator of the second one.

According to Table 10, 65% of students had incorrect answers in the item b. The difference of the item b from the others was that we simplified the result fraction $(\frac{3}{2}+\frac{5}{2}=4)$. Maybe, that was the main reason for the errors of students in the item b. In the item d, 74 students (16%) wrongly did the addition as below: keep the numerator unchanged and add the two denominators. However, the number of students having right answers was rather large. The percentages in the items were 65% (a and c), 82% (d) and 81% (e).

Therefore, we could assert that because of the impact of adding natural numbers, students will be wrong to add two fractions as follows: the numerator of the first one plus the numerator of the second one, and the denominator of the first one plus the denominator of the second one.

CONCLUSION

The results of the investigation showed that students made mistakes in identifying fraction. In our opinion of this study, students' mistakes occurred due to the following reasons:

(1) Primary school students learned the concept of fraction intuitionally and in an informal way. They studied this concept by observing visual figures, not by formal definition of fraction (Figure 1). Furthermore, in system of exercises to identify "fraction" in the textbook, there were not any exercises considered as non – examples of a whole divided into unequal parts like the question1 (for verify the research question 1). It is noted that in teaching a mathematics concept, the use of examples and no-examples is very helpful for students to understand the concept.
(2) The notion of a fraction itself is a difficult concept because it is related to the concept of rational numbers. Therefore, in order to understand the fraction concept, students need to do several exercises related.
(3) Due to the habit of doing mathematics in environment of natural number before, students also easily make the mistakes because of their confusion of fractions with natural numbers (Ndalichako, 2013).

In order increase the effectiveness of teaching the topic of fraction, together with the suggestions of Amato (2005), Nicolaou and Pitta-Pantazi (2012) and Khairunnisak et al. (2011) which were mentioned earlier, From of this study, two measures should be used:

(1) Using examples and non – examples to help students understand fraction in a correct way
(2) Using different representations during process of teaching topic "Fraction" such as: number lines, area

Figure 1. How to present the concept "fraction" in Mathematics 4 – Vietnam.

models, volume models.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Theme: The 21st century adult learner

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Problem-based learning is an innovative educational approach that is gaining prominence in higher education using "real world" problems or situations as a context for learning. The present study explored the use of problem-based learning with teacher trainees of the University of Belize. Using a concurrent mixed method design with 74 teachers in training from the Belmopan and the EU Sugar Belt Project in the Orange Walk and Corozal Districts, teachers in training were immersed in the development and application of Problem-Based lessons, and learning centres. Identified in survey instruments is that, problem-based learning can be applied across all areas of study of Belize's Primary and Lower Secondary curricula by aligning concepts with authentic problems stimulates critical thinking, and provides the use of a pragmatic approach to teach real- life concepts. Responses from focus group interviews and application of Problem-based learning centres with primary and secondary students are that this inductive model of teaching stimulates higher order learning when compared to other traditional pedagogical practices.

Key words: Problem-based learning, critical thinking, cooperative learning.

INTRODUCTION

The report entitled, Challenges and Opportunities in Belize Education Sector denotes that "Belize is paying a lot for education but getting little. More youth are outside the school system than in it, and many fails to make the transition to the workforce. More and more youth drop out of school, and become involved in gang activities. While the challenges are great, the recommendation is to focus on increased efficiency, quality and equity (2013).

It is suggested by this report that there is a need to examine Belize's Education System with increased attention on teacher training, and quality of education delivery at all levels. The phrase "getting little", which is synonymous to the term diminishing returns, also alludes to a lack of meaningful and relevant education in Belize.

While this research study cannot address factors, which impede quality educational delivery, what is emphasized herein are best practices to improve the training of teachers and promote 21st century thinking skills including creative thinking, collaboration and innovative pedagogy (Carroll, 2007; Trilling and Fidel, 2009). Efforts to assess effectiveness of Problem-Based Learning are aligned to contemporary research findings which suggests that 21st Century Learning Skills are critical for accomplishing transformation in educational delivery and student achievement.

There are many proposed instructional strategies to raise standards as evidenced using effective pedagogy and acquisition of skills. What is important is an

understanding of how students learn, including the importance of fostering metacognitive thinking, and immersing teacher trainees in authentic experiences to promote higher order of thinking.

This involves the use of planned activities, knowledge of one's own thought processes, beliefs and intuitions (Schoenfeld, 1992). Essentially, the use of problem-based learning at the tertiary level of training in Belize must include opportunities for instructional practices to connect prior knowledge to new learning (National Research Council, 2000).

LITERATURE REVIEW

21st century teaching and learning methodologies are reflective of practices aimed at engaging students in cognitive learning, and the development of higher order thinking skills (Christensen, 2008; National Academies of Science, 2007).

This research study focus on the effective use of problem-based learning as a viable instructional method that challenges students to "learn to learn", and to working cooperatively in groups to seek solutions to real world problems (Duch et al., 2001).

Using the sociocultural theory as the basis for social interaction and language within a cultural context, students refine problems, develop research questions, investigate topics using a wide variety of primary source materials and engage in critical thinking activities to identify possible solutions to real world problems (Johnson, 2009). It is envisioned that promotion of a critical thinking learner centred approach within teacher training institutions in Belize will:

1. Foster high levels of thinking and engagement among teacher trainees;
2. Promote application of more meaningful teaching and learning activities across all levels of schooling;
3. Reinforce the need for effective use of collaborative strategies for self-regulation of learning;
4. Support approximating understanding/use of prior knowledge to meaningfully construct understanding.

Research context

The University of Belize is an English-speaking multi-locational institute for higher education, and the national university of Belize. The university's vision is to foster Belize's development by preparing graduates for a future of dynamic change with relevant knowledge, lifelong skills, for continuous empowerment. It is with this vision that the Faculty of Education and Arts consistently evaluates its teaching approaches to keep abreast of the emerging needs of learners, stakeholders and Belize. Teacher training programs accessible in Orange Walk, Corozal, Belize, Belmopan, and Punta Gorda promote

the most innovative pedagogy to address the changing dynamics among students and the various school systems. This research then explores the importance Problem-Based Learning including the use of metacognitive activities to assist teacher trainees to garner skills to promote critical thinking and problem solving skills.

Overview of problem based literature

In recent years, problem-based learning has taken on a greater prominence in tertiary education directed at independent and team learning. It incorporates a variety of methods: peer teaching, collaborative learning, metacognitive skills, self-regulation, and use of cognitive apprenticeship (Creedy and Hand, 1995).

Proponents of the Sociocultural Theory suggest that Problem-Based Learning is grounded on constructivist assumptions that: knowledge is co- constructed in social learning groups, knowledge is developed in meaningful contexts, and knowledge is anchored in and indexed by relevant contexts (Barrow, 1996; Marra et al., 2004).

What's more is that the constructs for teaching Problem-Based Learning are very different from traditional classroom/lecture teaching because it fosters independent thinking as opposed to conventional direct instruction and rote learning (Wells et al., 2009). A major thrust is the interactive dynamism among learners fostering analytic student-centred thinking in collaborative learning groups (Enger et al., 2002; Wee and Kek, 2002).

Knowledge construction within meaningful contexts is rooted in situated learning (Hung, 2002). Situated learning or situated cognition suggests that meaningful learning is embedded in activities that promote exploration of the environment (Dewey, 1903, 1961).

Consequently, schools should take advantage of children's natural curiousity by bringing the outside world inside, and the need for memorable representations of concepts (Jonassen, 2006, 2010). While Problem-Based Learning is a viable model to promote critical thinking, lectures remain the dominant pedagogical strategy (Bligh, 2000; Pascarella and Terenzini, 2005).

Instructors need to be cognizant that in lecture type instructional settings, students are less actively involved than their instructors perceive them to be. Approximately, one-half of students' time during lectures is spent on thinking about things unrelated to the lecture content (Johnstone and Su, 1994; Milton et al., 1986). If 21st century learners are to be educated in the process of developing critical thinking, problem solving, and communication skills, use of meta-level cognitive activities for lifelong learning is of paramount importance.

While skill development is a vital component of problem-based learning, teachers must also skilfully seek opportunities for students to think, reflect and become engaged in meaningful activities (Hacker et al., 1998).
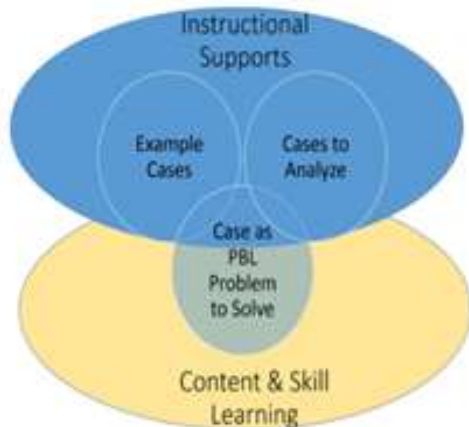
Figure 1. Relations between case functions and problem based learning (PBL) (Source: Marra et al. (2014) Journal on Excellence in College Teaching).

This has to do with identifying activities to promote metacognition which is critical awareness of one's thinking and learning as a thinker and learner (Flavell, 1987; Hmelo-Silver, 2004).

Additionally, teachers need to develop authentic *in situ* experiences. *In situ* problems are represented in cases providing opportunities to draw on prior knowledge to solve problems to learn content and skills (Jonassen, 2010). Case studies require contextually relevant problems to facilitate interdisciplinary learning by making meaningful connections between specific topics and real world societal issues, and applications (Bonney, 2013).

Although case studies appear to be significantly more effective than other methods, production of novel case studies is time consuming and requires skills not all instructors have perfected. Despite the assumption that authentic cases are not easy to develop, a recent study to assess perceptions of learning gains using case study revealed positive correlations associated with oral and written communication skills, and the ability to make connections with real life situations (Bonney, 2015).

As shown in Figure 1 (Marra et al., 2014), Case studies are pivotal to teach content and skills to promote analytical thinking. That is, students assume responsibility for their own learning by interpreting authentic problems, monitor their own learning and apply their background knowledge to solve problems (Jonassen, 2014; Prince, 2004).

Apparent is that case studies are an integral component of problem-based learning, and provides opportunities for students to synthesize complex analytical questions. It also increases self-efficacy for learning and performance by providing opportunities to view issues from multiple perspectives (Yalçınkaya, 2012).

Even as problem-based learning is a viable model for

21st century learners, there are notable limitations. The first is that instructors must invest more time to assess learning. This includes identifying suitable performance assessment to assess levels of competence and skills to perform an activity or create a product (Airasian, 2000). This can only occur if teachers can skilfully assess students' engagement and learning in social learning groups (Sockalingam and Schmidt, 2011; Zimmerman, 2002; Zimmerman and Moylan, 2009).

Teachers must also be skilled at identifying tasks and activities that would question students' knowledge, and beliefs in order to steer them in the right direction. Even as it is recognized that teachers should possess a multiplicity of skills, problem-based learning may be foreign to some instructors; hence they may experience difficulty altering their traditional teaching styles (Reithlingshoefer, 1992; Wood, 2003).

An exploratory study

An exploratory design is a viable research design to investigate a research problem when there are few or no earlier studies to refer to (Ballard, 1990; Barbie, 2007). The primary purpose of this exploratory study is to gain insights into the use of problem-based learning as a viable 21st century learning tool. The Mann-Whitney U test, a rank-based nonparametric test, was used to determine if there are differences between two groups of teachers in training on a continuous or ordinal dependent variable. Pallant (2009) posits that the Mann-Whitney U test is a robust non parametric test to assess independence of observations. The following assumptions for use of the Mann-Whitney U test were accounted for in this study:

Assumption 1: One dependent variable was measured at a continuous or ordinal level. The ordinal variable used was a 5 point Likert Scale to assess perceptions of effective use of Problem Based Learning.
Assumption 2: One independent variable consisting of two categorical independent groups. Examples include gender and teaching experience.
Assumption 3: Use of independent observations. In this study there was no relationship of the independent variable or between the groups themselves. That, is the participants on UB's Belmopan campus differ from those in the EU Sugar Belt Project.
Assumption 4: Assessment of the distribution of ratings of both groups. This is accounted for in the comparison of variables: males and females, type of training, and qualifications

Research problem

This study was guided by the following research problem: How and why is problem-based learning a useful

approach in teacher education/training?

Research questions

1. Can use of Problem-Based Learning promote opportunities for active engaging and knowledge construction?
2. Can Problem-Based Learning activities promote the development of self-directed learning?
3. Can use of Problem-Based Learning activities provide context to foster critical thinking?
4. Can use of Problem Based Learning Centres promote collaborative learning?

In addition to the research problem and questions, to guide the analysis of data, the following null hypothesis was utilized:

There is no significant difference in perceptions of the effective use of problem-based learning among students enrolled in teacher education programs in the European sugar belt program, and those enrolled at the University of Belize central campus in Belmopan.

METHODOLOGY

A study was undertaken with a convenience non-probability sample of teacher trainees enrolled in methods classes on the University of Belize Central Campus in Belmopan and in the European Union Accompanying Measures for Sugar Project in the North of Belize. The methodology was largely quantitative. Qualitative data were also collected from open-ended items and focus group responses. The data was collected over a four month period commencing January to April 2016. In the first stage, teacher trainees were trained to teach using Problem-Based Learning. Thereafter, they developed problem-based lesson plans, and learning centres. Students also taught problem-based lessons at the primary and secondary levels of schooling in 26 schools to assess whether this inductive module of teaching:

1. Promoted opportunities for active engaging and knowledge construction
2. Promoted the development of self-directed learning
3. Provided context to foster critical thinking
4. Promoted collaborative learning

A 5 point Likert scale instrument consisting of 4 statements in each of the following categories was used to collect the quantitative data: Constructive/active learning, Self-directed Learning, Contextual Learning, and Collaborative Learning. The average inter-item correlation revealed 0.7 "Cronbach's alpha (α). Conventionally editors and reviewers consider a measure of alpha 0.70 as reliable for research purposes (Bland and Altman, 1997; Helms et al., 2006).

RESULTS

Mean participant age was 32 years (SD=7.55). Twenty-one participants (36.8%) were male and thirty-six (63.2%)

were female. Twenty-eight (51%) highest qualification was that of an associate's degree, twenty-four (43.6%) bachelor's degree, and three (5.4%) with a master's degree. Forty (71.4%) are in-service teachers, and two (3.6%) pre-service teachers. Fourteen (25%) are in training with no teaching experience.

Table 1 shows the means, standard deviation and internal consistency (Cronbach's α) for each of these sub-scales of the 5-point Likert scale ratings 1 to 5. The data revealed that all four measures: opportunities for active engaging and knowledge construction, development of self-directed learning, provide context to foster critical thinking and promote collaborative learning were very high (mean=4.7053; mean=4.4842; mean=4.5643 and mean=4.5929, respectively). Scores for items on constructive and active learning were the highest while the scores on self-directed learning were the lowest.

Perceptions of the effectiveness of problem-based learning to provide opportunities for active engaging and knowledge construction were the same for males and females (*Mann Whitney test*: *p*=0.639). Similarly, perceptions of the effectiveness of problem-based learning to provide opportunities for active engagement and knowledge construction were the same for participants in Belmopan and Orange Walk/Corozal (Mann Whitney).

However, the perception is different among participants with different professional qualification and with different teaching experience (*Kruskal-Wallis Test*: p=0.025 and p=0.023, respectively). Compared to participants who possess bachelor's degrees and master's degrees, participants who possess associate's degrees had greater propensity to feel that Problem-Based Learning provides opportunities for students to engage in active learning and knowledge construction (p=0.035).

Also revealed is that pre-service teachers had a greater propensity than other teachers to feel that Problem-Based Learning was not as effective in providing students the opportunity in active learning.

What was indicated by this finding is a consistency of beliefs that Problem-Based Learning provided opportunities for students to be actively engaged in knowledge construction. This aligns to a national survey of public school teachers in the U.S which revealed that they were most likely to use Problem-Based Learning in their classrooms which promotes 21st century skills such as collaborative learning and presentation techniques (Bradley and Mosier, 2014) (Table 2).

Perceptions of the effectiveness of problem-based learning towards development of self-directed learning was the same between genders, among participants with different professional qualification and among those with different teaching experiences (Mann-Whitney test: p=0.065; Kruskal-Wallis Test: p=0.411; Kruskal-Wallis Test: p=0.512, respectively). These quantitative findings are supported by trainees' responses to open ended

Table 1. Mean, standard deviation and internal consistency (Cronbach's α) for each sub-scale.

Scale	Mean	Std. deviation	(Cronbach's α)
Opportunities for active engaging and knowledge construction	4.7053	0.04787	0.793
Development of self-directed learning	4.4842	0.05772	0.699
Provide context to foster critical thinking	4.5643	0.05622	0.767
Promote collaborative learning	4.5929	0.06303	0.818

Table 2. Rating of effectiveness of problem based learning to provide students with the opportunity for active engaging and knowledge construction.

Sub-scale	Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly disagree (%)
Assume responsibility for investigating the problem	43 (75.4)	14 (24.6)	0 (0)	0 (0)	0 (0)
Construct understanding with peers	42 (73.7)	14 (24.5)	1 (1.8)	0 (0)	0 (0)
Vocalize their thinking	33 (58.9)	22 (39.3)	1 (1.8)	0 (0)	0 (0)
Think critically	44 (77.2)	13 (22.8)	0 (0)	0 (0)	0 (0)
Build on existing knowledge/skills	43 (76.8)	10 (17.8)	3 (5.4)	0 (0)	0 (0)

items which denote that:

1. Problem based learning (PBL) would be an excellent instructional approach for the 21st century learners. We must move away from traditional ways of teaching and allow our learners to gain knowledge through experience and practical/hands-on activities. It is through this means that our learners will retain content for life and not merely for testing. PBL can create more meaningful lessons, ones our students would appreciate and they would also want to always be a part of (Trainee #27).

2. Problem-based learning is a solid approach because it is a student-centred approach where students learn and use their critical thinking and cognitive skills. To be better at solving any scenario or problem and the 21st century students are more efficient in doing work and pair share work. (sic. #28).

3. It is a productive learning strategy. It makes student aware and able to easily understand how the modern society works. They are also introduced to the actual work that would be conducted in their career. It gives them the experience one cannot get from learning theory alone (Trainee #29).

Noteworthy are the beliefs that problem-based learning promotes active engagement and these align to studies with medical students who indicated that clinical performance was enhanced through use of active engagement in real life experiences. Shown is that active learning is embedded in research studies which illustrate that problem-based activities develop deep understanding of important ideas and thoughtful

engagement (Colliver, 2000) (Table 3).

Perceptions of the effectiveness of problem-based learning to provide context to foster critical thinking was the same between genders, among participants with different professional qualification and among those with different teaching experience (Mann-Whitney test: p=0.328; Kruskal-Wallis Test: p=0.199; Kruskal-Wallis Test: p=0.149, respectively).

Also revealed is that respondents perceived that when students are intrinsically motivated to succeed, they perform better in high cognitive tasks (Pink, 2011). Suggested is that self-motivation is an integral benefit of PBL. Further indicated by the qualitative data is that teacher trainees conceded that:

1. The use of the model was quite useful in having the students get a greater grasp of the content. It allowed them to think outside of the box. The only issue I encountered was executing a learning center in all my classes. It is quite a disadvantage at a high school level when the teacher meets the students in different home-rooms" (sic.# 17)
2. It does suit children needs since it opens their minds to look up solutions by themselves hence learning how to tackle real-life situations (sic. # 35)

Identified in these perspectives is that teachers enrolled in methods classes view self- directed learning as an integral component of problem based learning. These perceptions align to standards for the 21st century learner (2009) which denote that learners should "pursue personal and aesthetic growth including adaptability, managing complexity, and self-direction (Greene andAzevedo, 2010) (Table 4).

Table 3. Rating of effectiveness of problem based learning to provide students with the opportunity for development of self-directed learning.

Sub-scale	Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly disagree (%)
Compare and contrast two or more things or ideas	33 (57.9)	22 (38.5)	1 (1.8)	0 (0)	1 (1.8)
Make predictions and observe what occurs	33 (57.9)	22 (38.6)	2 (3.5)	0 (0)	0 (0)
Identify a cause and effect	28 (49.1)	23 (40.4)	6 (10.5)	0 (0)	0 (0)
Search for various resources of information	27 (47.4)	26 (45.5)	3 (5.3)	1 (1.8)	0 (0)
Become self-directed learners	37 (64.9)	17 (29.8)	3 (5.3)	0 (0)	0 (0)

Table 4. Rating of effectiveness of problem based learning to provide students with the opportunity to foster critical thinking.

Sub-scale	Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly disagree (%)
Apply knowledge to discuss a problem	32 (59.3)	20 (37)	2 (3.7)	0 (0)	0 (0)
Apply knowledge to other situations/problems	32 (58.2)	21 (38.2)	2 (3.6)	0 (0)	0 (0)
Making learning meaningful by connecting to real life examples	40 (71.4)	14 (25)	2 (3.6)	0 (0)	0 (0)
Foster interdependence	28 (50)	23 (41.1)	5 (8.9)	0 (0)	0 (0)
To not only learn the content but to interpret why or how it is used	36 (65.5)	18 (32.7)	1 (1.8)	0 (0)	0 (0)

Perception of the effectiveness of Problem-Based Learning towards promoting collaborative learning was the same between genders, among participants with different professional qualification and among those with different teaching experiences (*Mann-Whitney test*: *p*=0.909; *Kruskal-Wallis Test: p*=0.723; *Kruskal-Wallis Test*: p=0.230, respectively).

Revealed is consistency in the view that Problem-Based Learning promoted critical thinking among students as indicated in focus group responses:

1. Problem-Based Learning helps address students' learning needs. It fosters critical thinking and allows for cooperative learning. Also the only thing for me is that it is difficult to apply for all subjects. It is easier for Math Problem Based Learning allows for our students to develop their critical thinking skills, learn to work with groups and develop teamwork (sic. #3)

2. For teaching it is a good model if we want our students to become critical learners and for them to take responsibility of their learning. At the same time to use what is learned now to solve a problem and apply it in daily life problem to solve problem (sic. #4)

3. The study believes that problem based learning helps address students' learning needs. It fosters critical thinking and allows for cooperative learning. Also, the only thing for me is that it is difficult to apply for all

subjects. It is easier for Math and Science based subjects (Trainee #5)

These perceptions align Problem-Based Research which denotes that this inductive model of teaching can potentially enhance critical thinking supported by strategic implementation and supportive facilitation (Jonassen, 2014) (Table 5).

Most (53.5% to 73.2%) of the respondents strongly agree that PBL effectively promotes collaborative learning by providing opportunities for students' initiated discussion, co-constructing understanding, working with more accomplished peers, critical thinking and cognitive modelling of ideas. Few respondents (1.8% to 5.4%) have a neutral view of this. Similarly, few respondents (1.8% to 3.6%) disagree that PBL promotes co-construct of understanding, provided opportunity for students to work with more accomplished peers, and stimulated critical thinking.

Nevertheless, less than 5% of the respondents perceived that collaborative learning was unsuited, 95% were of the view that sociocultural activities provide meaningful learning opportunities. That is, students benefitted from meaningful engagement in communities of learning. Perceptions of the importance of collaborative learning in qualitative data indicate that:

Table 5. Rating of effectiveness of problem based learning to provide students with the opportunity to promote collaborative learning.

Sub-scale	Strongly agree (%)	Agree (%)	Undecided (%)	Disagree (%)	Strongly disagree (%)
Students initiated discussion	30 (53.5)	23 (41.1)	3 (5.4)	0 (0)	0 (0)
Co-construct understanding	33 (58.9)	21 (37.5)	1 (1.8)	1 (1.8)	0 (0)
Work with more accomplished peers	37 (66.1)	16 (28.5)	1 (1.8)	2 (3.6)	0 (0)
Stimulates critical thinking	41 (73.2)	13 (23.2)	1 (1.8)	1 (1.8)	0 (0)
Cognitive modelling of ideas	41 (73.2)	13 (23.2)	2 (3.6)	0 (0)	0 (0)

1. This model of teaching will be useful and it will help students to better understand concepts. It will address students' learning needs because children will work in a group so they can help each other. I think it is something good to use in our classrooms. Some teacher might have used it but under different name (sic. #41).

The study perspective of the use of problem based learning as a 21st century instructional approach is a good one. As teachers are trying to promote student-centred classroom as well as enhancing students' critical thinking, this approach will guide and facilitate teachers to develop such skills (sic.#42). The study believe this model could assist students in becoming responsible for their own learning, and help them become critical thinkers. At the same time, students will develop other skills and attitudes that well assist them to do better and be productive individuals (Trainee #43).

CONCLUSION

The findings reveal that majority of students enrolled in education programs at University of Belize consider problem-based learning as an effective instructional tool to facilitate students' learning. This aligns to hundreds of comparative studies comparing problem based learning to traditional instruction (Kellner and Share, 2007; Perkins, 2008). The meta-analyses/systematic reviews on the use of problem base learning also point to positive results for cognitive, developmental, and affective outcomes (Gainer, 2010).

The p-value (> 0.05) as indicated in Table 1 concludes a failure to reject the Null hypothesis (H_0) indicating that there is no significant differences in perceptions of the effective use of problem based learning among students enrolled in the European Union Sugar Belt Program, and those in University of Belize's Central Campus for both genders. Shown is that participants who possess associate's degrees were less likely than other participants with higher education qualifications to believe that problem based learning provides opportunities for students to engage in active learning and knowledge construction. One challenge identified by respondents is the lack of resources to continuously implement problem based type activities.

Although it is important to examine generalizability, what is worth noting is that the findings of this study align to two comparative action research conducted during the period January to May 2016 in Belize to assess effectiveness of collaborative learning on performance. One study examined effectiveness of cooperative learning using multimedia sources and interactive techniques as tools for teaching clauses and sentence structure.

This study which was conducted with 9th grade students revealed that collaborative activities using technology improved students' ability to site clauses and improve writing skills (Wade, 2015; Babbie,1998). A second action research with 9th grade students to examine collaborative learning as an instructional tool to teach grammatical and mechanical structures revealed that the use of collaborative learning increased knowledge and performance of students with B and below average (Aguilar, 2016). What is illustrated is that the use of focused group activities can potentially aid in the development of higher levels of performance.

Even though there are multiple sources of evidence to support use of problem based learning in Belize, it could be informative to confirm these findings using a larger sample and repeating this study in the remaining five teacher training institutions in Belize. This would strengthen the assertion that the use of Problem Based Learning can promote critical thinking as an integral component of teacher training and educational delivery in Belize.

RECOMMENDATIONS

Based on observations of teaching practice in Belize, it is reasonable to conclude that it may be challenging for educators to smoothly transition from knowledge provider to facilitator of learning.

"The reality is that learners who are new to PBL require significant instructional scaffolding to support the development of problem-solving skills, self-directed learning skills, and teamwork/collaboration skills to a level of self-sufficiency where the scaffolds can be removed" (Savery, 2006).

To adopt a problem-based learning approach, teaching institutions must engage professional staff in extensive tutor-training programs in recognition of the critical importance of their role in facilitating the PBL learning experience. Recommended by theorist and Standford News Letter is the need for:

1. Clearly defined purpose for PBL engagement: This is important to ensure that clear learning goals and objectives are identified.
Professional development sessions for teachers. Professional development training is a major requirement to ascertain whether lecturers/teachers understand the theoretical foundations of PBL which requires a pragmatic approach to teaching.
2. Development of structured problems: Instructors must develop skills to write relevant problems to facilitate critical thinking and reflection.
3. Use scaffolding skills and less direct instruction: Emphasis on guiding learners to seek answers, ask questions and to extend their thinking must become the major focus of PBL activities.
4. Plan for collaboration among learners: This must include opportunities for co-construction of knowledge and the development of meaning verbal learning promoting building on prior knowledge and conceptual understanding.
5. Assess authentically: Real- life task must be assessed using alternative means of assessment.

CONFLICT OF INTERESTS

The author has not declared any conflict of interests.

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