

Motivation to pursue PhD Studies in Mathematics and Sciences Studies among International Students in a Research University

Sylvestre Munyengabe ¹, He Haiyan ^{1*}, Shan Liangyan ¹, Zhao Yiyi ¹

¹ School of Education, Beijing Institute of Technology, Beijing, CHINA

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ABSTRACT

This study tried to explore what motivates international students to attain PhD graduation requirements in mathematics and sciences studies in a Chinese research university. The design of the study was qualitative and all collected data were analyzed by thematic analysis. The study explored the motive forces that enable international PhD students to persist and solve all challenging situations to fulfill PhD graduation requirements in mathematics and sciences studies. The internal and external motivations were found to be the main cause of their persistence to continue their studies until they meet their graduation requirements. International PhD students in mathematics and sciences reported to be challenged by the communication barriers, unfit social interaction, advanced software to be used and different high requirements to be attained in a research university. The discussions of findings considered other existing related studies and theories that help people to persist and achieve their desired goals and targets. Possible solutions to existing challenges and further research' areas were suggested in this study.

Keywords: mathematics and sciences studies, graduation' requirements, international students, internal motivation, goal setting and expectancy

INTRODUCTION

Mathematics and sciences studies have proven to be influential studies in the development of countries (Munyengabe et al., 2017c). Nowadays, exchanges programs and mobility of international students has increased in different countries in order to gain the quality education (OECD, 2012). According to OECD (2012), many OECD countries in past 15 years, has received the significant portion of international PhD students reaching at 21% in different doctoral programs. For example, according to the Statista (2017), international students in China significantly grew from 238,184 in 2009 to 397,635 in 2015. This growth significantly indicates the will of China to attract and help international students to have access on its educational programs. Referred to this statistics' report, Chinese government has more doubled the number of scholarships offered to international students from 18,245 candidates in 2009 to 40,600 in 2015. Not only the increment of scholarship winners but also self-supported international students number grew from 219, 939 in 2009 to 357,055 in 2015. This explains how international students are continually being interested to pursue their studies into different program offered in different research universities of China (OECD, 2012). A big number scholarship owners in many countries offering schools is highly made by Mathematics, sciences and engineering studies (OECD, 2012).

It is very important to research on the current mobility of international students in order to know barriers and the results yielded from this form of exchange in mathematics and sciences studies (Li and Bray, 2007). There, also exists the gap in literature that would be covered by conducting researches identifying the motivation and challenges hindering to meet the benefit of these international educational exchanges. Different expectations of these international motilities among students include the pursuit of academic and professional growth (Li and Bray, 2007), intellectual stimulation (Khadria, 2011), economic benefits (Kim et al., 2011), increment of social status (Finn, 2007) and seeking political stability and freedom (Altbach, 2004). International students' experiences and motivations to persist from the beginning until the completion of the whole program would require a high

Contribution of this paper to the literature

- The level of motivation (internal & external) among international PhD students help in attainment PhD graduation' requirements in mathematics and sciences studies.
- The international PhD students were found to be highly challenged by communication barrier, unfit social interaction and high requirements to be attained by international students in mathematics and sciences studies within a research university.
- External pressures such fear to time without good results, pressures from family background and community and the shame of returning home without their PhD degree certificates were shown to be influential in pushing students to attain the graduations requirements in mathematics and sciences studies.

motivational level of studying in order to overcome different barriers that hinder their targets. Different studies such those of Beck (1983), Hoy and Miskel (1987), Locke and Henne (1986) examined this will of attaining the goal and targets that individuals plan to achieve. It has been certainly proven that the way individuals perceive on the task to be achieved affects the level of attaining the requirements on that task (Mitchell et al., 1987; Green, 1992; Pennington, 1995; Porter et al., 2003).

The existing gaps of few literatures in this area exploring the motivational level and challenges hindering the attainment of PhD graduation requirements among international students in the research universities will be focused in this study.

RELATED LITERATURES

The study reviewed the literature related to motivational theories and experiences allowing international PhD students to persist in different challenging situations to meet their graduation requirements. The goal setting and self-expectancy motivational theories can be good theories to be considered in such study related to mobility of international students (Porter et al., 2003; Locke and Henne, 1986). Different studies indicated how international students' mobility played important role by exchanging cultural diversities, knowledge content, manpower requirement, economic development and the increment of tourism (OECD, 2012; Lovitts, 2008; Weidman et al., 2001).

The attainment of graduation requirements among international students were found to be favored by internal motivation together with goal and self-expectance theories that push international students to reach their targets (Hoy and Miskel, 1987; Pennington, 1995; Beck, 1983; Deci and Ryan, 1985). The mobility of international students have been found to be influenced by factors such as poverty or unfavorable conditions in poor countries and desire of exploration and tourism for student from developed countries (Altbach, 2004; Finn, 2007). Some studies classified these factors as pull and push factors to motivate international PhD students to pursue PhD studies in high challenging situations (Khadria, 2011; Kim et al., 2011; Li and Bray, 2007).

Factors which push international PhD students were found to be in agreement with the previous studies related to expectancy theory where it was described in different researches including that of Green (1992), Pennington (1995), Porter et al. (2003), and Robbins (2003). From that international PhD students believe that the fulfillment of PhD graduation requirements would be the main key of reaching their expectations of becoming good employees or employers to overcome the existing barriers in their home countries. This theory was found to be among the most comprehensive useful approach in other many approaches regarding the expectation of work motivation (Vroom, 1964). According to Vroom (1964), it is stated that there is considerable evidence that performance increases with an increment of the extent of reward offered for successful performance.

Not only the expectancy theory but also the goal setting theory that was illustrated to be influential in motivating international PhD students to be successful in their overseas studies. According to this theory, people are internally stimulated by their interested intentions, set objectives and goals to be achieved (Hoy and Miskel, 1987). The theory affect international PhD students behavior in four different ways: (1) Provides direction and actions of the people who consider to achieve the specific goal; (2) Provides objectives of encouraging efforts towards the goals; (3) Provides objectives to increase the persistence of people, this will be converted into more time is needed to achieve the desired target and; (4) Motivates the person's search for effective way to attain the target.

The level of motivation among international PhD students play a vital role to influence the attainment the requirements of graduation in their host universities. Motivation toward any achievement explains the will or the stimulation to sustain the goal-oriented behaviors (Weiner 1992). According to Griffin (2013), motivation involves a series of modifying and directing human behaviors into desired patterns of work. It also illustrates the individual's choice, effort, engagement, persistence, orientation and performance on a desired task to be achieved (Eccles and Wigfield, 2002; Hoy and Miskel, 1987). The internal motivation of individuals goes in hand with the

significance of the expected results or targets to be achieved (Hoy and Miskel, 1987; Pennington, 1995; Beck, 1983; Deci and Ryan, 1985; Wigfield and Eccles, 2000).

Internal and external motivation are valued in increasing international PhD students' zeal to persist and reach their target. According to Piché (2003), Deci and Ryan (1985), internal motivation was viewed as doing something because it is interesting and enjoyable. Once an individual is intrinsically motivated for an activity, he/she may wish to do this activity for the pleasure that gives him/her its execution. Intrinsically motivated lecturers, teachers, students or other any other kinds of human beings do not hesitate to put in more effort and do more deeply their activities to achieve their plans (Munyengabe et al., 2017 a). From the views of Piché (2003), Deci and Ryan (1985), external motivation was illustrated as doing something because it leads to a separate outcome. If an individual is externally motivated to do an activity, he/she will do perfectly this activity because of being pushed by external elements or for a reward provided to that activity such as competitions, punishment, reward and social pressure (Munyengabe et al., 2016).

The persistence on attainment the graduation requirement for PhD studies relay largely on internal and external interests to do the research (Lindholm, 2004). The students' attainment the graduation requirements depends largely on the supervisors' guidance and orientations. The advisor role in many case focuses on helping students to shift from the dependence as in earlier stages of their previous studies to the independence stage where PhD students are given the fully opportunity to explore largely their research orientations (Gardner, 2009a; Lovitts, 2008).

Different research identified different challenges that hinder the attainment of PhD graduation requirements for international PhD students. It is also important to note that the lack of advisors' assistance to PhD student may cause the serious barriers or delay the fulfillment the graduation requirements (Lovitts 2008; Munyengabe et al., 2016 and 2017a). Not only the lack of the advisors assistance that hinder the quick success of meeting the graduation requirements but also the barriers attached to the socialization of international students where in some case they found themselves being in very challenging societies which they do not value or respect international diversities (Golde, 2000). Another very challenging barrier is the language of instruction and language of research for publications where for some countries train their students in their mother tongue different from other languages that are mastered by international students (Lovitts, 2008). This barrier also causes the limitations in the assistance offered by students' advisors. International PhD students had different research interests from their advisors which hinder their progress and meeting the requirement at the expected time (Weiner, 1992). Due to the family background or countries of origin some students also were found to be challenged by the financial constraints and need of fulfilling the needs of everyday life (Le and Gardner, 2010; Sato and Hodge, 2009). Identifying the motivational cause and challenging barriers hindering the attainment of the graduation requirement were not much focused and few researches were only conducted in some countries.

PURPOSE OF THE STUDY

Today's globalization and international exchanges can play a vital role to solve barriers in any country by sharing experiences and skills required to overcome different challenges faced in different countries. From that, different countries through their educational system have promoted cooperation and increased the number of international students to study in their universities. The initiative includes attracting private candidates and scholarships winners to come and study in various universities of the host country. Besides all of these initiatives, international PhD students in research universities usually face different challenges which hinder the motivation to meet their graduation' requirements. This current study, aimed to explore international students' perceptions on the attainment the PhD graduation requirements in a research university. The study also aimed to find out the motivational level, challenges and possible solutions to overcome the existing challenges by answering the following research questions:

1. What motivates international students to persist in order to attain PhD graduation' requirements in a research university?
2. What are the challenges do international PhD students meet to fulfil the graduation requirement in a research university?
3. What are the recommendations would you suggest to address all challenges?

MATERIAL AND METHODS

The study was qualitative in its nature (Creswell, 2000). It was important to use the qualitative approach because the study reported the International PhD Students' perceptions concerning the force that motivates them and challenges hindering their motivation to meet their graduation' requirements in a selected Chinese research university. The qualitative data for this research was crucial because through the interviews and conversations,

participants were given enough time to discuss and report about their experiences (Denzin and Lincoln, 2003). Views were interpreted through interpretive processes to understand the general individual' perceptions (Guba and Lincoln, 1994).

PARTICIPANTS

This study reported the views of thirty-five PhD international students selected from one hundred international PhD students in one of research universities of China located in Beijing town. Only interested students participated into the study. The participants were international students from ten different countries including: Pakistan (15), Vietnam (2), Ethiopia (4), Kenya (3), Tanzania (4), Thailand (1), Nigeria (1), Algeria (3), Egypt (1) and Rwanda (1). Both male (92%) and female (8%) participated into the study. PhD' candidates were majoring in Mathematics and different sciences options. For responding to the request of participants the name of participants were not presented in the study but their views were given in the form of grouped views. The similar respondents' responses to each question of the study were grouped together and presented in the form of groups (GR1, GR2...).

DATA COLLECTION

Through interviews processes as explained earlier, data were collected starting in June 2016 to December 2016. The researcher responded to the need of respondents to conduct the interviews and conversations in the specific and preferred places. The interview' duration varied between thirty minutes to one hour and a half. During the interview processes, international PhD' students were given enough time to express themselves by responding to questions related to their perceptions regarding to what motivates them to persist in doing their researches and overcome challenges that hinder to meet the requirements for PhD graduation. Similar to Creswell (2000), Spradley (1979), Denzin and Lincoln (2003), structured and open-ended questions related to this study were used with the full flexibility to allow all sampled international PhD students to link and attach their experiences to the questions of the study. The interview was conducted in English because all respondents were majoring their studies in English language and it was conducted basing on the existing literatures focusing on theories regarding the motivation theories that show the origin of persistence and working hard to meet the graduation requirements.

DATA ANALYSIS

All collected data were analyzed by thematic analysis (Denzin & Lincoln, 2003). The thematic analysis is one of most common form used to analyze qualitative data. This form of analysis emphasizes on pinpointing, examining, and recording patterns (or "themes") within data (Denzin and Lincoln, 2003). The study involved deductive and inductive coding (Boyatzis, 1998). The analysis focused on categorization themes based on existing literatures (deductive) while inductive focused on theme and variabilities emerged from data (Creswell, 2000). The choice of qualitative approach as explained earlier was influential because all collected data were based on dialogue and its interpretation basing on the existing theories of motivation. Similar data were grouped together and analyzed by considering existing studies and theories of motivation. Mainly, the study aimed to find what motivates international PhD' students to persist and continue to pursue their studies regardless all challenging barriers that hinder their motivation to attain the graduation requirements. Through thematic analysis of data, the study reported all challenges hindering the motivation to meet the requirements of graduation for international PhD students. Possible solutions and strategies were shown to overcome all identified challenges.

ETHICAL CONSIDERATION

The full confidentiality and secrecy were guaranteed to the respondents by the following activities: a) By their requests respondents' names were not shown in the study, b) all data were recorded c) respondents who were interested to sign the informed consent were allowed to sign and d) finally similar data from different respondents were grouped together and analyzed referring to existing theories related to the study.

RESULTS

Research findings and discussion were generally based on particular concepts to reflect on research questions. The findings show the perceptions on what motivate international students to meet PhD graduation' requirements and challenges that hinder their motivation were presented. Finally possible solutions to identified challenges were proposed in this study.

Student' Motivation to Attain Graduation' Requirements in Mathematics and Sciences Studies

The participants showed the persistence to continue finding ways to attain their graduations requirements because of two main raisons: internal motivation towards their goal setting before starting their studies and external factors such social pressure, recognitions and job expectation after their graduations. All collected data are presented respectively to each question of the study.

Internal Motivation to Pursue PhD Studies in Mathematics and Sciences Studies

Participants have showed their internal interests to pursue PhD studies in a Chinese research university. Similar views were grouped and presented together. The response to this question were categorized in four different groups named GR1, GR2, GR3 and GR4. The percentage of respondents in each group are presented in [Figure 1](#).

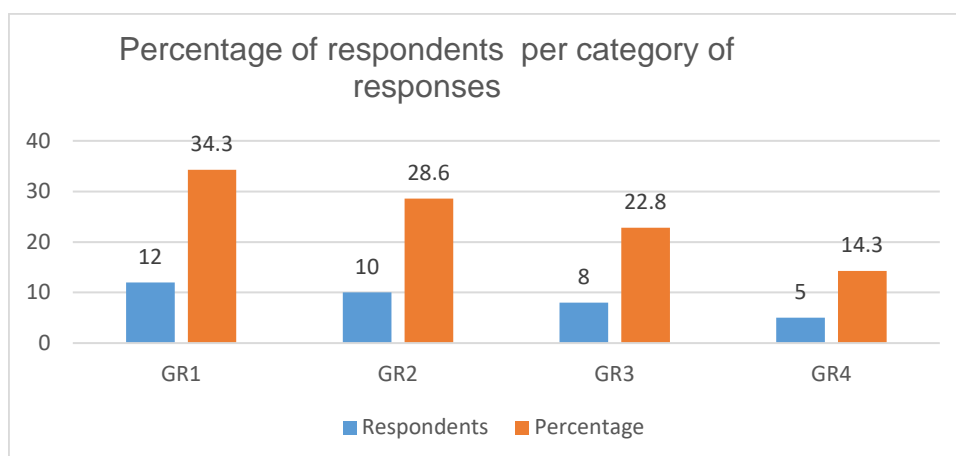


Figure 1. Percentage of respondents per views related to internal motivation

All statements expressing the internal interest are presented as follows:

GR1: "I am challenged with different barriers, but I was determined to work hard so that, I can achieve my targets. From my childhood I love studying and I have decided to continue my studies until I get my PhD certificate".

GR2: "My success will make me strong and I love my major and I am interested to get my PhD certificate".

GR3: "After getting my masters' certificate, I felt motivated to continue my PhD studies. It is a struggle to meet the graduation requirements but it was my first choice and I have to work hard and get my PhD certificate in chemistry".

GR4: "I enjoy studying, after my PhD studies I plan to continue my post-doctorate studies I am self-motivated to work hard and get my PhD degree in mathematics".

Data regarding international PhD students' internal motivation were grouped into four categories (GR1, GR2, GR3 and GR4). Analyzing all collected data, it is well observed that 100% of international PhD students showed the interest, thirst and zeal to learn and get a PhD certificate mathematics and sciences studies. In GR1, International PhD students showed that they are challenged, but their internal decisions push them to persist and continue working hard so that they can meet the graduation requirements. The cheer love of the pursued major and the need of success were the major findings presented in GR2. In GR3, international students were pushed by their intrinsic motivation where they showed to enjoy their choice and self-determined to work hard in order to get their PhD degree. Finally, data collected and presented in GR4, showed another group of international students PhD students who have the plan to continue their post- doctoral studies and showed their self-motivation and interest in doing researches.

External Motivation to Pursue PhD Studies in Mathematics and Sciences Studies

Findings collected showed how international PhD students pursuing their doctoral studies are interested to work hard in order to meet the graduation requirements set by the research university. The motivation to pursue PhD studies was extremely linked with external pressures that might explain their persistence to overcome all challenging situations and decide to meet the PhD graduation requirements (Piché, 2003; Deci and Ryan, 1985;

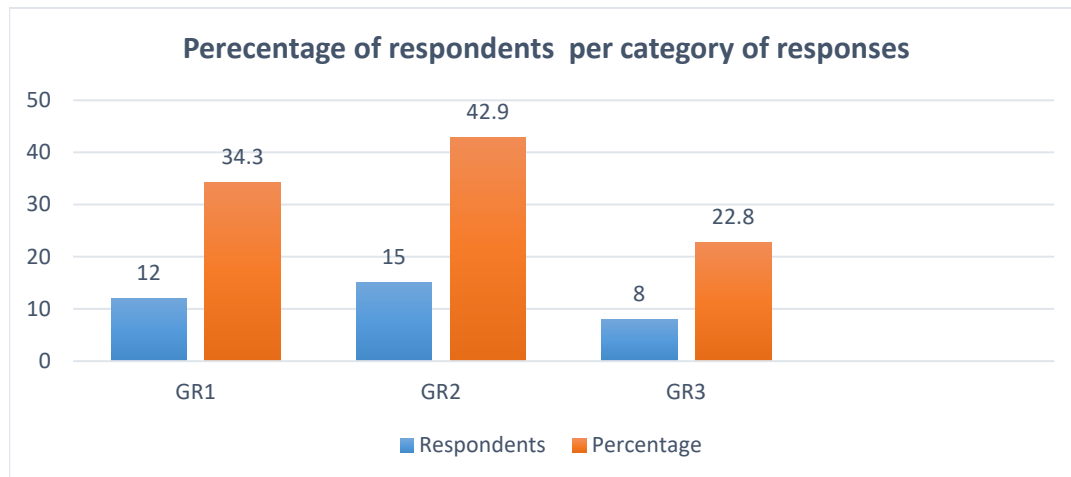


Figure 2. Percentage of respondents per reported views related to external motivation

Weiner, 1992). Results were categorized in three categories (GR1, GR2 and GR3) of views related to external motivation presented in **Figure 2**.

The collected different views related to external motivation are the followings:

GR1: “I have to work hard and neglect all challenging situations because after my graduation I hope to get a god job and high pay with promotions”.

GR2: “My decision of working hard to meet the PhD requirements for graduation is irreversible because I have spent my time which would be used for other developmental activities”.

GR3: “My failure to get a PhD degree can harm my reputational background in my family, society because PhD holders are valued individuals in my country”.

From above views grouped into GR1, GR2 and GR3, it is well observed that all international PhD students are highly motivated by different external factors such expectation of good job (Green, 1992; Pennington, 1995; Porter et al., 2003; and Robbins, 2003); good payments (Deci and Ryan, 1985); fear to spend their time without good results, pressures from family background and community (Le and Gardner, 2010) and finally the expectation of respect and the shame of returning home without their PhD degree certificates (Golde, 2005; Lovitts, 2008).

Constraints for Meeting PhD Graduation Requirements and Suggested Solutions

Data regarding the constraints to meet the graduation requirements in mathematics and sciences revealed three categories of challenges that are faced by international PhD’ students to meet the graduation requirements. These constraints included: constraints attached to the communication barriers, social interaction, requirements to be recovered by international students. Besides all of these different challenging situations, the study illustrated different suggestions which would be helpful to facilitate PhD students to attain the requirements in the proposed time.

Lack of Adequate Communication

Similar to the previous other researches in other countries, findings revealed that international PhD students in a considered research university are very challenged with the communication barrier (Le and Gardner, 2010; Sato and Hodge, 2009). Collected data from all respondents showed that 100% of PhD students recognize communication as one of barrier in their studies. Four collected different views and their percentages are given in **Figure 3**.

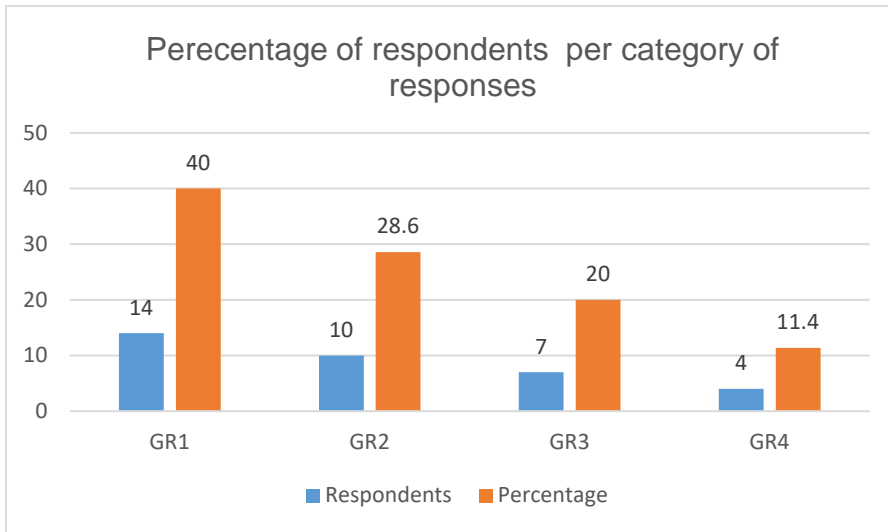


Figure 3. Percentage of respondents per reported views of communication barrier

The collected different views related to communication barrier are the followings:

- GR1:** “It is not easy to communicate, the language of my study area requires a lot of time to be communicative. Normally, I am frustrated of not sharing some idea with peer national students”.
- GR2:** “It is hard to be communicative and share some content with our classmates because my level of communication with other national students language is low to be at the level of communicate easily with nationals”.
- GR3:** “My communications with others sometimes is favored by translating text messages but I can’t communicate purposely for gaining news skills for enriching my knowledge content”.
- GR4:** “I am challenged with the communication barrier because in the group meeting with national students, I can’t really share any experiences with my classmates”.

The barrier of lacking the adequate communication with national students was proven to hinder all international PhD students to attain their requirements graduation. Analyzing data presented in GR1, GR2, GR3 and GR4, it is well observed that international PhD students face challenges of not sharing experiences and knowledge with their peer national students (Golde, 2000; Lovitts, 2008).

Unfit Social Interaction

Findings obtained from collected data showed how international PhD students are faced with challenging situations related to the cultural diversities and the unfit social interaction as presented in Figure 4.

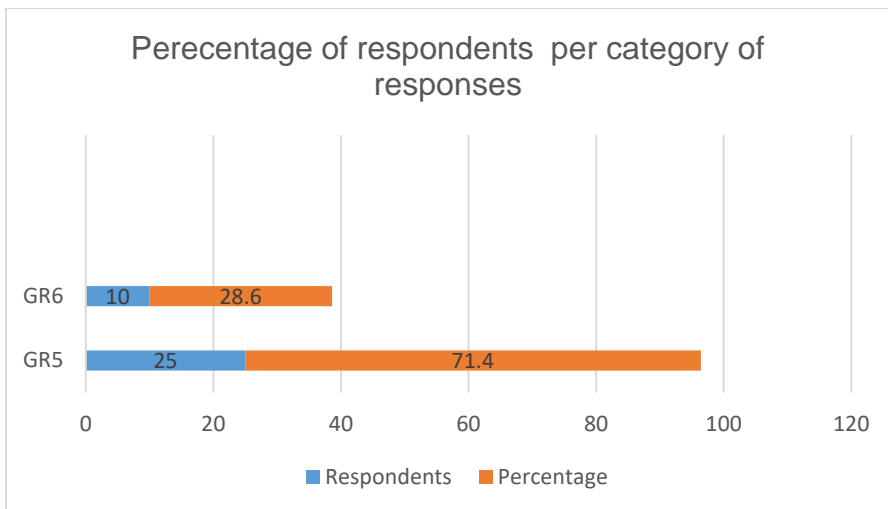


Figure 4. Percentage of respondents per reported views with social barrier

The collected different views related to communication barrier are the followings:

GR5: “Many times I feel unmotivated because of being frustrated in my activities, the social interaction is somehow limited, Cultural limits are also very challenging barriers”.

GR6: “Our cultures differ from one country to another, I really feel dissatisfied because the social interaction is necessary for everyday life”.

Social interaction have an influential impact in shaping international PhD students. As indicated in GR5 and GR6, all international students showed to be less motivated according the way the hosting society treats them (Lindholm, 2004; Gardner, 2009b). Analyzing above statements, it is well observed that international PhD students value the great importance of social interaction and cultural diversities of their hosting society (Golde, 2000; Lovitts, 2008).

High Graduation’ Requirements to be Attained in Mathematics and Sciences Studies

Findings demonstrated that universities requirements to be attained are very challenging and difficult to be attained (Gardner, 2009b; Golde, 2000; Lovitts, 2008). All of students showed that main challenges is the requirements to publish their research papers in higher ranked top journals which might require an additional time to attain the required number of research papers at planned time. The views related to this barrier are presented in **Figure 5**.

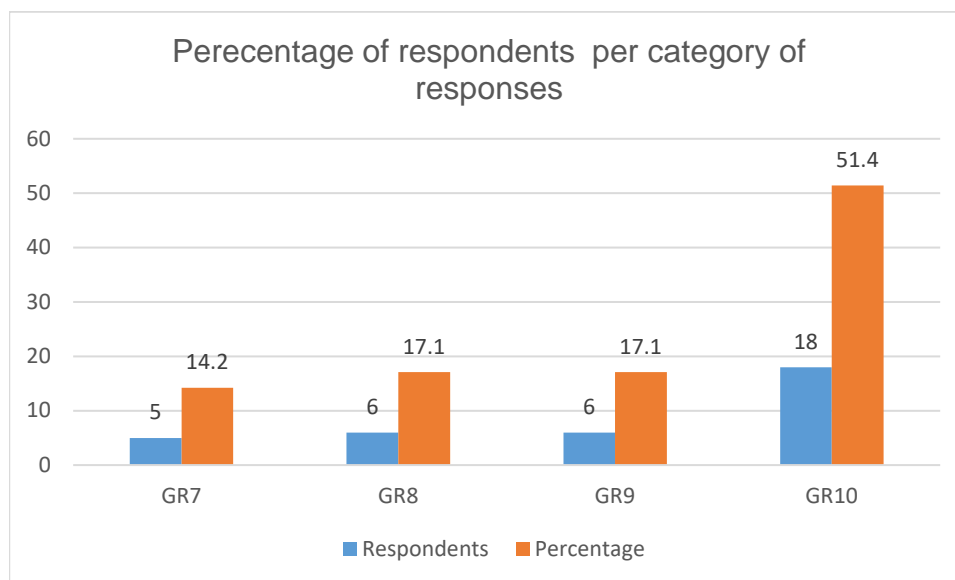


Figure 5. Percentage of respondents per reported views of high requirements to be attained

The collected different views related to communication barrier are the followings:

GR7: “It is difficult to attain the requirements in the proposed time because my faculty requires to publish my researches in high top journals which would take a lot of time”.

GR8: “Publishing in SCI indexed journals is good but very challenging and time consuming, I think they should also accept other different peer reviewed journals but not only underlying on SCI, SCIE and SSCI indexed journals.”

GR9: “The graduation requirements are really high to be attained in expected time, I really extended my studies because of that, in my opinion they should reduce these requirements and accept all peer reviewed journals instead of high ranked and top journals.”

GR10: “Some supervisors require high reputational journals which require very sophisticated software to mean that the successfulness requires an additional time to prepare research papers and be published in such journals”.

From above findings (GR7, GR8, GR9 and GR10) international PhD students showed how the requirements to graduate in top ranked research universities are very high and time consuming. From above suggestions international PhD students were suggesting that the universities should accept other peer reviewed instead of focusing only on SCI, SSCI and SCIE indexed journals.

DISCUSSIONS

Pursuing the PhD studies in Mathematics and sciences requires the students to be aware and motivated internally and externally so that they can attain the PhD graduation requirements. Such research exploring what motivates students to pursue PhD studies in Mathematics and sciences studies is among of important research area to illustrate all challenging situations and feasibility of the current international student mobility (OECD, 2012). Regardless different factors related to participants characteristics such as: age, gender, family background, cultural diversities, social pressures and many other different barriers; it is shown that the success to meet the graduation requirements for international PhD students explains the great importance of being motivated to achieve their targets (Piché, 2003; Deci and Ryan, 1985; Weiner, 1992; Munyengabe et al., 2017b).

All thirty-five PhD candidates who participated in this study were mainly characterized by the pressure from different factors and their internal motivation to pursue PhD studies, so that they can attain the graduation requirements (Golde, 2000; Lovitts, 2008). It is well noted that the persistence of continuing the struggles of meeting the requirements for graduation in mathematics and sciences studies may differ because of the sources of motivation among considered participants (Lindholm, 2004).

The findings from the current study illustrate different sources of motivation that push international PhD students to meet their graduation requirements in mathematics and sciences studies. Their motivation, was shown to be shaped largely by individuals' experiences, educational background, social background, cultural diversities and social' pressure (Deci and Ryan, 1985). Different studies on international students' mobility such those of Altbach (2004), Khadria (2011), Kim et al.(2011) and that of Li and Bray (2007) suggested that international students motivation are highly linked with the broader policy environments at both the host and home country.

The findings from the study provide the evidence on what motivate international PhD students in a research university. Their motivation was been greatly influenced by their internal and external motivations which push them to persist and achieve their targets (Deci and Ryan, 1985). International PhD students expressed the high intrinsic interest to pursue their PhD studies in mathematics and sciences studies because all of them showed that before starting PhD program, they made their own choice according their interests. Some of them, enjoy reading, doing research, and plan also to continue their post-doctoral studies in same field which express their internal motivation to do research (Altbach, 2004). Setting the goal was a major characteristic of sampled international PhD students pursuing their studies in mathematics and sciences studies in a research university. This, was shown by the views where international students expressed their decisions of working hard until they reach their targets (Beck, 1983; Hoy and Miskel, 1987; Locke and Henne, 1986).

Another cause of persistence expressed by international PhD students pursuing their studies in mathematics and sciences in the considered research university was the external force which pushes them to achieve their target. Findings from all data collected showed how there are other different factors such the expectation of good job (Deci and Ryan, 1985; Hoy and Miskel, 1987; Pennington, 1995; Beck, 1983; Wigfield and Eccles, 2000), promotion (Munyengabe et al., 2016; Wanga and Xiao, 2017), social pressure and shame of returning home empty hands (Altbach, 2004; Khadria, 2011). International PhD students also expressed the high motivation to pursue PhD studies because of the expectation of social respect paid to PhD' holders in their respective countries. Considering other studies on motivation to achieve targets, it is well shown that the achievements largely depends on the combination of academic and sociocultural motivations. From that, it is agreed that if students fail to integrate their academic and sociocultural motivation in their everyday academic activities, it may affect their planned achievement and it is advised to take into consideration the integration of both academic and sociocultural motivations in their everyday activities (Griffin, 2006).

Not only the force which motivates international PhD students to pursue their doctoral studies and meet the graduation requirement in mathematics and sciences was explored, but also this study tried to find out the major challenges which hinder their commitment to meet the graduation' requirements. Similar to other previous studies in other countries the lack of adequate communication and language proficiency, unfit social interaction and the high requirements of host universities were identified to be among major challenges that hinder their attainment of graduation requirements in mathematics and sciences studies (Gardner, 2009b; Golde, 2000; Lovitts, 2008). The suggestions to handle all challenging situations were strongly linked to the requirements to be achieved in order to meet the graduation requirements. Despite all paid efforts to meet the requirements international PhD students suggested that the host universities should consider other journals using the peer review processes to evaluate the manuscripts to be published instead of relaying only top ranked journals indexed in SCI, SSCI and SCIE.

LIMITATIONS

The study was interesting for the researcher and participants who were interested to report their motivations and challenging situations and possible solutions that could be used to overcome the identified challenges. Most of

international PhD students were interested to participate into the study, but the limited time caused to have the limitation in the number of respondents where a third of the whole population contributed to the study as earlier discussed.

CONCLUSION AND FURTHER RESEARCHES

Pursuing PhD studies in mathematics and sciences is one of the continuous ways required to bring the needed changes and innovation so that countries may adapt on nowadays' technological and the required development. The way students are motivated on the desired programs have a positive influence on their final results. Hosting international students play a vital role in developing the country economically and exchanging cultural diversities, knowledge contents, manpower requirements and tourism increment. It is the responsibilities for the hosting universities to change life possible and help international students to reach their targets and development plans. Besides students' internal and external motivation to attain the graduations requirements; students' advisors should avail a lot of time to support their students to be able to solve all challenging situations to attain their graduation 'requirements. Students should also be facilitated to advance their level of language so that they can remove all communication barrier which hinders the attainment of requirements for graduations. It is also good to consider other journals using peer review process instead of relying on top SCI, SSCI and SCIE indexed journals which are somehow time consumers. Further researches should be retaken to explore more challenges by considering deeply other levels of education and factor such as cultural, learning environmental and personal differences so that studies in mathematics and sciences could be reached on the desired contributions.

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