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No Pain, No Gain: The Necessary Initial Struggles to Enable Doctoral Research Work

Yifan Zhang, Matthew Pike, and Dave Towey

School of Computer Science, University of Nottingham Ningbo China,
Ningbo, Zhejiang 315100, People's Republic of China
{yifan.zhang, matthew.pike, dave.towey}@nottingham.edu.cn

Abstract

Purpose – This paper reports on experiences at the start of a Software Engineering (SE) PhD, where the candidate encountered and overcame multiple challenges setting up his research environment, which included online learning (and supervision) elements. When preparing a replication study, the candidate faced both hardware and software problems as he lacked both the necessary equipment and the experience to run the project. Eventually, the candidate changed his mindset to see challenges as opportunities, reached out to various others to seek advice, and identified solutions to his problems. This paper shares these (necessary) challenging experiences, and the insights gained from them. As an integral part of doctoral-study skills development, this paper may help other students, advisors, and administrators be aware, and prepare for, these challenges.

Design/methodology/approach – The various experiences are reflected upon by the PhD candidate, and examined and analysed by himself, his academic advisors, and other relevant stakeholders. Comparisons are drawn with similar doctoral candidates, and other related experiences recorded in the literature. The unbounded nature of the problems encountered at the start of the doctorate was a shock to the candidate, and required expanding his perception of the problem- (and solution-) space, and fast development of new problem-solving skills. Supported by his advisors, the candidate unknowingly followed a self-directed, exploratory, learning framework, making use of online learning techniques and resources.

Findings – The candidate reports now knowing the importance of seeking help when unable to solve a problem. Through identification and communication with a mentor, the student has also seen the value of quickly and accurately presenting perceived challenges. While overcoming challenges, the candidate learned to brainstorm, and control panic, strengthening his independent researcher potential. Another, potentially culturally-related, insight is the professed importance of prompt honest communication with the advisor, who, unlike the undergraduate assessor role, has more responsibility for guidance and advising. Although our findings relate to experiences prompted by an SE replication study, they will resonate will many other research situations.

Originality/value/implications – Challenges are common at the start of a PhD, but there is little in the literature explicitly discussing this, or its necessity to enable the doctoral study. This paper proposes a framework that can provide guidance for both PhD students and supervisors. It also serves as a reminder to relevant administration staff of the provisions needed to enable, and ensure, that the PhD candidate emerges ready, mentally and skill-wise, from the experience.

Keywords: doctoral preparation; doctoral training; mental health; student-challenge expectations; student support structures.

1 Introduction

1.1 Background

Although many doctoral students are enrolled each year, current literature addressing the transition to doctoral studies from other degrees is limited (Heussi, 2012; Tobbell, O'Donnell, & Zammit, 2010). It is common that PhD students experience challenging transitions in their first year of study (Cluett & Skene, 2006; Crane et al., 2016; West, 2012), which could be caused by many factors. For instance, the expectations of the presumptive competence of individual learning can decrease the confidence and increase the feelings of isolation in postgraduate students, which may adversely affect the transition trajectory (Tobbell & O'Donnell, 2013a). Symons (2001) showed that some university staff have a limited understanding of the problems students will encounter during their transition to postgraduate level and believe that they do not need induction as they are already experts as students. As a matter of fact, many postgraduate students may need to work in the areas that are very different to the academic discipline they studied at their undergraduate level (O'Donnell, Tobbell, Lawthom, & Zammit, 2009). Furthermore, international students may also experience challenges in daily life such as social isolation, cultural shock or an unfamiliar academic environment in their first year, which will make their transition more difficult (Hall & Wai-Ching Sung, 2009). If PhD students who are in trouble do not get enough help and attention, it may cause serious problems for their mental health, research outcomes and even have a negative impact on other peers and staff (Danna & Griffin, 1999; Levecque et al., 2017).

This paper describes the experience of a PhD candidate who overcame challenges to set up his research environment, such as lack of experiment devices, and how he adapted himself to the postgraduate level of study to pass through the transition period. Additionally, this paper proposes a framework for students on how to overcome challenges with the integration of the self-directed learning concept, which is a type of study that the learner takes the initiative, with or without the help of others, to organize his learning activities (Knowles, 1975), derived from the candidate's experience of unknowingly implementing this concept into his daily research.

Another factor that may help the candidate to get through is honest, effective communication with his supervisor. Research shows that successful students benefit most from active supervision (Deuchar, 2008), and students' perceptions of how well they will transit through the degree depend heavily on effective communications with academic staff (Bownes et al., 2017). Although doctoral supervision plays an important role in the success of PhD students, many students may have trouble with how to get along with their supervisors (Austin, 2002; Vilkinas, 2008). Therefore, advice for students on how to develop "healthy" relationships with their supervisors is offered in this paper as well, while the word "healthy" here refers to both supervisors and students are working as expected within the scope of doctoral supervision.

1.2 Structure

This paper is structured as follows. Section 2 gives a literature review about the existing studies for the transition to postgraduate level of study, self-directed learning and doctoral supervision. Section 3 describes the experience of the candidate in the first

year as a PhD student, explaining how he adapted and overcame difficulties. Section 4 outlines the findings of the candidate after one year of studying. It also proposes a framework for students to handle challenges and maintain "healthy" relationships with their supervisors. Section 5 concludes the paper, and discusses some potential future work that may be performed.

2 Literature Review

2.1 Transition to postgraduate level of study

The difficulties that students may encounter when transitioning from lower degrees to doctoral studies have been ignored for a long time. Although there have been many studies focusing on how to help students become successful in their first year of university (Baik, Naylor, & Arkoudis, 2015; Kift, 2009), materials for the transition to postgraduate, especially doctoral, level are scarce (Tobbell & O'Donnell, 2013b; Heussi, 2012; Tobbell, O'Donnell, & Zammit, 2010).

Although there maybe assumptions that doctoral students should not experience a large difference in the learning environment since they are already somewhat experts in the domain of higher education (Tobbell, O'Donnell, & Zammit, 2010), this in fact, may not be correct: West (2012), for example, found that more than half of students with an undergraduate degree thought the transition process was challenging. In addition, eighty percent of PhD students surveyed found the coursework in their first year to be overwhelming (Cluett & Skene, 2006). One research conducted in 2016 among 319 postgraduate students found that students did not receive adequate support during the transition to postgraduate studies (Crane et al., 2016). Therefore, more understandings is needed of the difficulties faced by students transitioning to be postgraduate students (Tobbell, O'Donnell, & Zammit, 2010).

If the situation is not handled well, it may cause severe problems to postgraduate level of students, either mentally or physically. A study held by Levecque et al. (2017) based on 12 mental health symptoms (GHQ-12) found that about one-third of PhD students have a potential risk of suffering from psychiatric disorder, particularly depression. The difficulties that students may encounter during transitions to doctoral studies have been ignored for a long time. Although there are many studies about how to help students become successful in their first year of university (Baik, Naylor, & Arkoudis, 2015; Kift 2009), similar investigation of the transition to postgraduate level is scarce (Tobbell & O'Donnell, 2013a; Heussi, 2012; Tobbell, O'Donnell, & Zammit, 2010).

Therefore, it is significant and worthwhile to examine on how to handle the challenges encountered during the transition process to doctoral studies, which is what this paper aims to do.

2.2 Self-directed learning

Self-directed learning (SDL) is a concept to describe a type of study. There are many definitions of SDL, from different perspectives (Loeng, 2020), and several models have been proposed to help examine and understand it (Candy, 1991; Brockett & Hiemstra, 2018; Garrison, 1997). For instance, Candy (1991) proposed a four-dimensional model for SDL that includes personal autonomy, self-management, learner-control and

autodidaxy. Brockett and Hiemstra (2018) created a model called "Personal Responsibility Orientation" (PRO) to see SDL in two directions to help understand the concept. The first direction defines SDL as a process "in which a learner assumes primary responsibility for planning, implementing, and evaluating the learning process" while the second direction defines it as a goal to be "a learner's desire or preference for assuming responsibility for learning". Similarly, Garrison (1997) proposed a three-dimensional model that includes self-management, self-monitoring, and motivation, which focuses on the use of resource and learning strategies, as well as the motivation to study. A common perspective for most conceptualizations is the self-control of the planning and management process in the learning experience (Garrison, 1997). This paper follows the definition that was proposed by Knowles (1975, p.18):

> In its broadest meaning, self-directed learning describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes.

In other words, the learner shall take responsibility for their cognitive development, with or without others help. This can be divided into four processes: tasks defining, goals setting and planning, process monitoring, and reflecting (Knowles, 1975; Winne & Hadwin, 1998). Process monitoring refers to monitor those processes that could represent the metacognitive awareness of the learner, which is an important ability to help him understand the effects of learning such that the efficiency may be improved in the future (Schraw, 1998). Reflecting refers to the self-evaluation conducted to document the performance and assess the strength and weakness that needs to improve. There are some models in the literature proposed to help the learner perform reflective practice (Borton, 1970; Argyris & Schon, 1978; Gibbs & Great Britain, 1988). Considering the difference of postgraduate degree to others, self-directed learning has become an important and necessary ability for PhD candidates.

2.3 Doctoral Supervision

Effective supervision plays an important role in the success of PhD students (Vilkinas, 2008). Research has examined individual and joint supervision in doctoral education (Barnes & Austin, 2009; Heussi, 2012; Sambrook, Stewart, & Roberts, 2008; Lahenius & Ikävalko, 2014).

Some studies have attempted to characterize the theory of supervision and the roles supervisors shall play (Lee, 2008; Halse & Malfroy, 2010; Vilkinas, 2008). Although differences exist, there are some common factors shared among them. For example, both supervisor(s) and student should work toward the same goal based on mutual respect and a firm commitment (Lahenius & Ikävalko, 2014). Supervisors should provide reliable information and be the social bond between student and the department and occupation (Barnes & Austin, 2009). Halse and Malfroy (2010) summarized the work of supervision that supervisors should be an expert on providing learning alliance and help the student understand the discipline of research and institutional context of doctoral study.

However, even though supervisors are essential to doctoral students, sometimes the relationships might go wrong (Austin, 2002). For instance, both sides may lack trust in each other, or fail to reach mutual expectations (Fagen & Suedkamp Wells, 2004). The existing literature indicates that good relationships and interactions between supervisors and students are the critical factors for those who took less time to complete their degrees (De Valero, 2001; Seagram, Gould, & Pyke, 1998), with students reporting the greatest benefits being from the active supervisions (Deuchar, 2008). Therefore, this paper also aims to help guide how to develop a good relationship and maintain effective interactions for both students and supervisors.

3 Experience

3.1 Making Connections with multiple people

Due to the lack of experiment equipment at the beginning of the semester and the analysis of the current devices, the candidate had to brainstorm solutions, and the first idea that came out was asking for others' help. This was the first challenge the student encountered during his PhD career since he had to do this independently, in contrast to his undergraduate studies, when the teachers usually prepared everything. The IT Department was the first idea came out of his mind due to their work characteristic. However, they could not provide an extra device as every PhD student had already been assigned with a computer, which failed to meet the requirements of the candidate.

Although this was unexpected, the student had to search for other solutions. The Library was his next stop as he was lucky to know that there was a new lab just finished construction, which has equipped with computers that suited his needs. After queries, he was finally introduced to a library administrator for Research and Learning in the Library. Although the administrator attempted to help, eventually it was not possible, as the relevant computers were reserved for public use only.

In addition to the people mentioned above, the student has tried to contact several other academic staff, but none could provide help because of personal and regulatory reasons. Such a series of failures have largely decreased the motivation of him. Thankfully, his supervisors have been accompanied with him all the time and encouraged him to brainstorm solutions with an open mind. For his supervisors to understand the situation he was facing, the student tried to write down his reflections without reservations in the weekly report and behave honestly in the meetings. Finally, perseverance paid off. The student managed to reach a professor through the introduction of his supervisor, who was willing to lend one of the computers in his lab, which solved this initial problem. **Fig. 1.** shows the result of brainstorming for the above progress, in which the sentences in bold and italic refer to the possible solutions and measurement criteria, respectively.

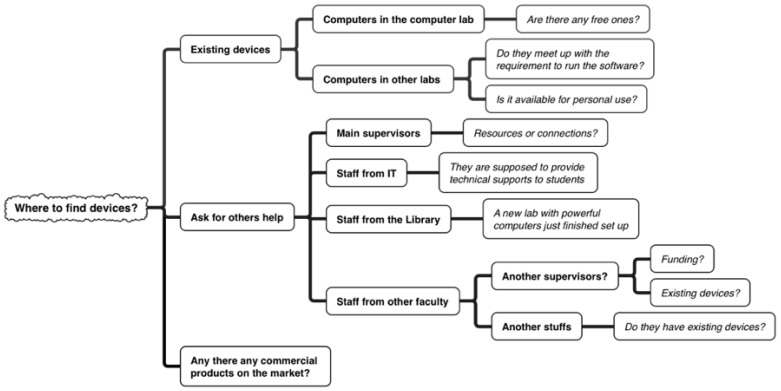

Fig. 1. Brainstorm process of finding the computer

3.2 Self-directed learning: The only way to survive and thrive

The candidate unknowingly implemented the self-directed learning concept into his research through a process iterated weekly. This consisted of four parts: defining, planning, monitoring, and reflecting (Knowles, 1975; Winne & Hadwin, 1998).

The first part in this iteration was the defining of the tasks the student should solve for now. It was usually done based on the analysis of the challenges he had, the progress he had already made, and other works he needed to do outside the project, for instance, part-time jobs. He then sorted them in order from primary to the least significant based on the effect they had on the overall progress.

After defining tasks, the student needed to set goals and make a plan. Considering the time and energy to be put on the project, the plan needed to be made neither too easy such that it would take few hours to finish, nor too hard that could influence other works the student was working on at the same time.

The third and fourth steps were performed usually at the end of the week. The student monitored the processes that could represent the metacognitive awareness and recorded them for future review. Then he reflected the entire progress made in this week, recorded the aspects that were not done properly with the emotional changes, and wrote it down into a document.

At the beginning of each week, the student listed all the challenges he had, reviewed the progress he had already made, and decided what tasks shall be finished in this week. He then grouped them into a report with the reflections of the last week and brought it to the weekly meeting with his supervisor, who would give opinions on it and provide guidance if needed. **Fig. 2.** shows one page of the weekly report as an example.

Weekly Report — Gabriel

Date: 2020/11/16
Week: 8

General Review

Last week I mainly followed the plan made in the weekly report. However, the work needed to be done before the replication process was underestimated such that I was not able to finish the experiment on time. Specifically, there were different problems that occurred every day, and some of them were solved the next day while some were not. Fortunately, the current progress has approached to the extent that the replication experiment can be done.

What I have done

I have made running logs in the last week and I put them in the appendix in the below section.

What I will do in this week

Currently, I have proceeded into the first step of replicating the research, i.e. extracting point cloud data from the recording. I will try to finish the second and third steps this week, which are manually adding noise outside the region of ROI and gathering data. Since the system version is different from the original ones that were used two years ago, there are many files and functions that have also been changed. Therefore, there would be challenges to re-perform the experiment, just like the situation in the previous week.

Self-Reflection

It took me three days to realize that the plan made in the last weekly report was too optimistic. The effect of the difference between system versions is underestimated. I have read a lot of issues published on the Apollo GitHub page and also post several ones. Fortunately, there is some progress that I found the old data bag used two years ago and was able to transform it into the form that the current system version can use. I think another reason why the speed is not fast is that it takes several minutes every time Apollo builds itself.

Appendix

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Challenges

- Still cannot solve the problem of the perception and traffic light module accidently switch on and off without control
  - have already submit this problem to the GitHub community of LGSVL; currently still exchanging information

1

Fig. 2. Sample page of a weekly report by the PhD student

3.3 Online communication and learning

As the work of the PhD candidate was highly specialized, which relied on uncommon software and hardware, it could be hard to find specific resources to help or assist learning. This was in contrast to undergraduate assignments which were well defined and lots of resources were available online and elsewhere. For the candidate, online communication was convenient, but it had a lot of uncertainties. For instance, he managed to get in touch with a peer who had experience on setting up the software environment with the help of his supervisor on the Internet. When encountering problems he could not solve, he would post it on the forum quickly but the waiting time was sometimes so long that would slow down the overall progress and there was almost nothing he could do. Such kind of situations had forced him to develop the abilities of

brainstorming and finding alternative strategies to reach the same goals, in other words, "Don't put all your eggs in one basket" (GoEnglish, n.d).

4 Findings

4.1 Findings through the candidate's own experience

After one year of studying, there are three lessons the candidate has learnt. The first lesson is the professed importance of prompt honest communication with the supervisor, who, unlike the undergraduate assessor role, has more responsibility for guidance and advising. It enables an emotional connection to be built between supervisors and students such that mutual understanding of the situation can be reached faster and easier. Meanwhile, it helps him develop a good relationship with his supervisor, which, as described before, is crucial to the success of doctoral students (De Valero, 2001; Deuchar, 2008).

The second lesson the candidate learnt is the necessity of perseverance with right skills and strategies. Since it is common for PhD students to face challenges (West, 2012), emotion control is essential to allow him to perceive the dilemma quickly. Additionally, the abilities of brainstorming and accurately presenting perceived challenges are crucial to the final answer as the former helps the generation of creative ideas while the latter can make clearer thinking and more efficient communications.

The third aspect the candidate finds useful is the habit of good documentation. Good documentation can enable him to review and reflect regularly, which also helps develop metacognitive awareness. Additionally, it can be reused in the dissertation or other paperwork such that the time and energy of him can be saved.

4.2 A framework guides students on how to handle challenges

This paper proposes a framework to help students better handle challenges with their supervisors. **Fig. 3.** presents the detailed flowchart with the implementation of the self-directed learning concept.

The flowchart starts with the time when students encounter new problems. As a PhD student, it is essential to realize that problem-solving is a part of the doctoral study process. Therefore, emotion control is the primary action he shall perform. If there is a problem with that process, it is recommended to record it in a document for future discussion, as the "monitoring and reflecting" process in the concept of self-directed learning (Knowles, 1975; Winne & Hadwin, 1998).

After successfully controlling the emotions, the next task is to brainstorm the solutions and analyse the situation. It is suggested for the students to list his progress and prioritize problems that need to be solve. The former can enable a better understanding of his achievement and improve his confidence; while the latter may help prevent interruptions by other unrelated tasks. This process corresponds to the "defining and planning" process described in the self-directed learning concept (Knowles, 1975; Winne & Hadwin, 1998). If the problems can be solved with the solutions generated, then recording to the document for future reflection is recommended; otherwise, it needs to go to the next phase where external assistance is required.

If the students cannot figure out solutions, or the strategies fail, it is important to find assistance instead of giving up, which would negatively impact his process and

emotions. The first choice should be the supervisors, who aim to help and guide, according to the rules of supervision (Halse & Malfroy, 2010). This process requires honest communication to build a mutual understanding of the dilemma, which should be based on the premise of mutual respect and sharing the same goals between both sides, as described in the theory of supervision (Lahenius & Ikävalko, 2014). For supervisors, at this stage, encouraging and motivating the student may be of primary importance (Deuchar, 2008). Because supervisors typically have more resources than students (Halse & Malfroy, 2010), including knowledge and connections, they should be able to guide students and find a solution together.

However, even though turning to supervisors is necessary and vital, students should not limit themselves to that only approach. While communicating with supervisors, they should find possible people who can provide assistance, for instance, peers and staffs. They can also publish the questions on the Internet if they find there are no similar ones before. No matter the problems are solved or not, students shall document the process. In addition, while waiting for the answers, students shall try to find any other parallel tasks to do instead of wasting their time.

The whole procedures described above is the framework this paper proposed to help students handle challenges based on the experience of the candidate and the concept of self-directed learning. Furthermore, it is not limited to natural science students but other students from different majors and levels of study.

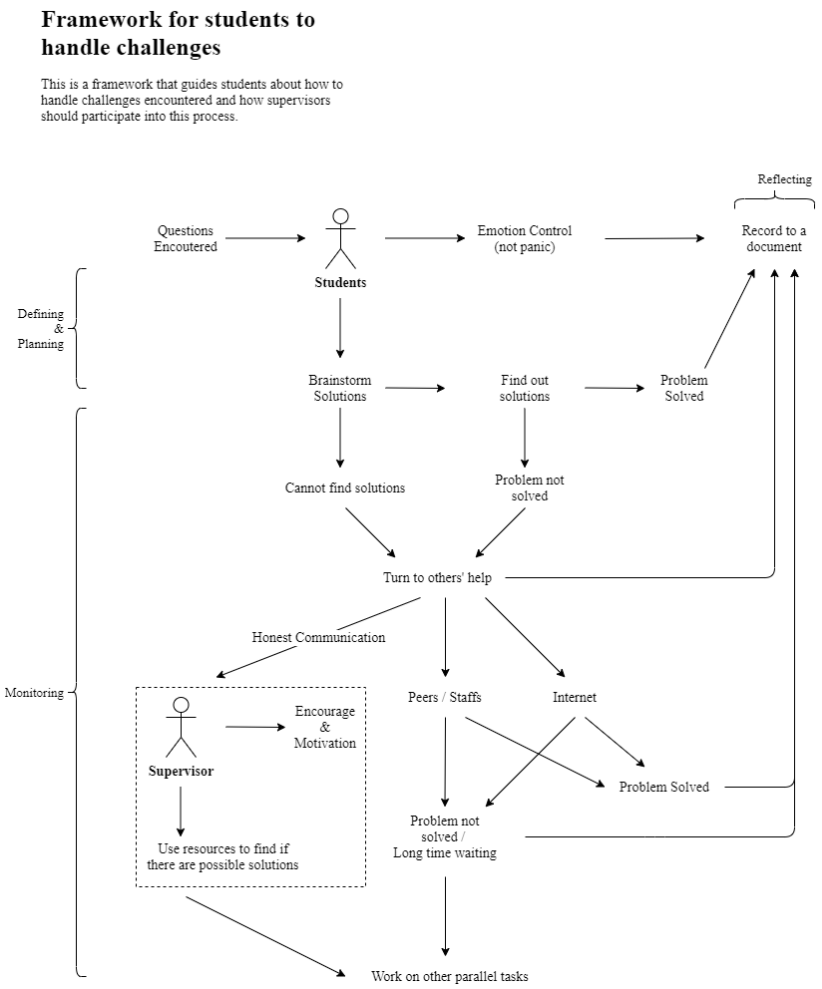

Fig. 3. Framework for helping students handle challenges

4.3 How to maintain "healthy" relationships with supervisors

Although there are multiple research studying the student-supervisor relationship (Styles & Radloff, 2001; Hodza, 2007; Mainhard, van der Rijst, van Tartwijk, & Wubbels, 2009), this paper offers some general suggestions on maintaining "healthy" relationships with supervisors, from the student perspective, which the word "healthy" here refers to both supervisors and students are working as expected in the range of doctoral supervision. There are three points the author believes are worth paying attention to:

1. Be honest and respect supervisors. This is the foundation of developing mutual trust and performing effective communications between supervisors and students (Baik, Naylor, & Arkoudis, 2015). It is necessary for students to understand the importance of

supervision and supervisors' work. Being honest can increase the trust of supervisors and gain their approval for the progress students have achieved such that supervisors can understand students better when students ask for help.

2. Treat the feedback correctly and have individual opinions. Although supervisors play a vital role in the success of students (Vilkinas, 2008), it does not mean everything that a supervisor says is correct. Sometimes students may have a better understanding about a task being worked on (Styles & Radloff, 2001). Therefore, it is important for them to develop their own opinions and be brave to discuss with their supervisors, which may save time and energy, and prevent misunderstanding from impeding the process (Hodza, 2007).

3. Understand the work of the supervisor and do not be over-sensitive. This is another point that students shall accept when they get along with their supervisors that supervision is only one of the jobs supervisors need to do (Barnes & Austin, 2009). As a result, it is normal when sometimes supervisors may not have time to look at students' work and give them feedback in time. Students should not be over-sensitive about it, which may lead to unnecessary suspicion, self-negation and even conflict. Patience is a crucial ability for students to develop both on their research and their interactions with supervisors (Brown, 2008).

5 Conclusion

This paper describes the experience of a PhD candidate who overcame challenges to set up his research environment and how he adapted himself to the postgraduate level of study to pass through the transition period. The findings of the candidate are outlined, with a framework proposed for students for how to handle challenges, and interact with their supervisors, based on some experiences of one of the authors in his first year of PhD study, which combines a self-directed learning concept with online learning techniques. Suggestions for students regarding how to maintain "healthy" relationships with their supervisors are also provided.

This paper does not experiment with the performance of the framework on the actual students, especially on the mental health conditions and work efficiency before and after the framework is applied, which is where the future works may focus on.

References

Argyris, C., & Schon, D. A. (1978). *Organizational learning: A theory of action perspective*. Reading, Mass: Addison-Wesley.

Austin, A. E. (2002). Preparing the next generation of faculty: Graduate school as socialization to the academic career. *The journal of higher education, 73(1)*, 94–122.

Baik, C., Naylor, R., & Arkoudis, S. (2015). The First Year Experience in Australian Universities: Findings from Two Decades, 1994-2014. *Melbourne centre for the study of higher education*.

Barnes, B. J., & Austin, A. E. (2009). The role of doctoral advisors: A look at advising from the advisor's perspective. *Innovative Higher Education, 33(5)*, 297–315.

Bownes, J., Labrosse, N., Forrest, D., MacTaggart, D., Senn, H., Fischbacher-Smith, M., Jackson, M., McEwan, M., Pringle Barnes, G., Sheridan, N., et al. (2017).

Supporting students in the transition to postgraduate taught study in stem subjects. *Journal of Perspectives in Applied Academic Practice, 5(2),* 3–11.

Borton, T. (1970). *Reach, touch, and teach: Student concerns and process education*. New York: McGraw-Hill.

Brockett, R. G., & Hiemstra, R. (2018). *Self-direction in adult learning: Perspectives on theory, research and practice.* Routledge.

Brown, L. (2008). Language and anxiety: An ethnographic study of international postgraduate students. *Evaluation & Research in Education, 21(2),* 75-95. Chicago

Candy, P. C. (1991). *Self-Direction for Lifelong Learning. A Comprehensive Guide to Theory and Practice*. Jossey-Bass, 350 Sansome Street, San Francisco, CA 94104-1310.

Cluett, L., & Skene, J. (2006). Improving the Postgraduate Coursework Student Experience: Barriers and the Role of the. *AUQF 2006*, 62.

Crane, L. H., Kinash, S., Hamlin, G., Eckersley, B., & Patridge, H. (2016). *Engaging postgraduate students and supporting higher education to enhance the 21st century student experience: Good practice guide*. Australian Government Office for Learning and Teaching. http://www.olt.gov.au/system/files/resources/SP14_4599_Kinash_Guide_2016.pdf

Danna, K., & Griffin, R. W. (1999). Health and well-being in the workplace: A review and synthesis of the literature. *Journal of management, 25(3),* 357–384.

De Valero, Y. F. (2001). Departmental factors affecting time-to-degree and completion rates of doctoral students at one land-grant research institution. *The Journal of Higher Education, 72(3),* 341–367.

Deuchar, R. (2008). Facilitator, director or critical friend?: Contradiction and congruence in doctoral supervision styles. *Teaching in higher education, 13(4),* 489–500.

Fagen, A. P., & Wells, K. S. (2004). The 2000 national doctoral program survey. *Paths to the professoriate: Strategies for enriching the preparation of future faculty*, 74-91.

Garrison, D. R. (1997). Self-directed learning: Toward a comprehensive model. *Adult education quarterly, 48(1),* 18–33.

Gibbs, G. (1988). Learning by doing: A guide to teaching and learning methods. *Further Education Unit*.

GoEnglish. (n.d.). Don't put all your eggs in one basket (don't risk everything all at once ...) http://www.goenglish.com/DontPutAllYourEggsInOneBasket.asp

Goh, J., Pfeffer, J., Zenios, S. A., & Rajpal, S. (2015). Workplace stressors & health outcomes: Health policy for the workplace. *Behavioral Science & Policy, 1(1),* 43–52.

Hall, G., & Sung, T.W. (2009). Mind the gap? A case-study of the differing perceptions of international students and their lecturers on postgraduate business programmes. *Indian Journal of Medical Ethics, 8*, 53-62.

Halse, C., & Malfroy, J. (2010). Retheorizing doctoral supervision as professional work. *Studies in Higher education, 35(1),* 79–92.

Heussi, A. (2012). Postgraduate student perceptions of the transition into postgraduate study. *Student Engagement and Experience Journal, 1(3)*.

Hodza, F. (2007). Managing the student-supervisor relationship for successful postgraduate supervision: A sociological perspective. *South African Journal of Higher Education, 21(1),* 1155-1165.

Kift, S. (2009). *Articulating a transition pedagogy to scaffold and to enhance the first year student learning experience in Australian higher education: Final report for ALTC senior fellowship program*. Strawberry Hills, NSW: Australian Learning and Teaching Council.

Knowles, M. S. (1975). Self-directed learning: A guide for learners and teachers, New York: Cambridge Books, 18

Lahenius, K., & Ikävalko, H. (2014). Joint supervision practices in doctoral education–a student experience. *Journal of Further and Higher Education, 38(3),* 427–446.

Lee, A. (2008). How are doctoral students supervised? concepts of doctoral research supervision. *Studies in Higher education, 33(3),* 267–281.

Lee, Y. N., Walsh, J. P., & Wang, J. (2015). Creativity in scientific teams: Unpacking novelty and impact. *Research policy*, *44*(3), 684-697.

Levecque, K., Anseel, F., De Beuckelaer, A., Van der Heyden, J., & Gisle, L. (2017). Work organization and mental health problems in phd students. *Research Policy*, *46(4),* 868–879.

Loeng, S. (2020). Self-directed learning: A core concept in adult education. *Education Research International*, 2020.

Mainhard, T., Van Der Rijst, R., Van Tartwijk, J., & Wubbels, T. (2009). A model for the supervisor–doctoral student relationship. *Higher education, 58(3),* 359-373.

O'Donnell, V. L., Tobbell, J., Lawthom, R., & Zammit, M. (2009). Transition to postgraduate study: Practice, participation and the widening participation agenda. *Active Learning in Higher Education, 10(1),* 26–40.

Sambrook, S., Stewart, J., & Roberts, C. (2008). Doctoral supervision... a view from above, below and the middle! *Journal of Further and Higher Education, 32(1),* 71–84.

Schraw, G. (1998). Promoting general metacognitive awareness. *Instructional science*, *26(1),* 113–125.

Seagram, B. C., Gould, J., & Pyke, S. W. (1998). An investigation of gender and other variables on time to completion of doctoral degrees. *Research in higher education, 39(3),* 319–335.

Styles, I., & Radloff, A. (2001). The synergistic thesis: Student and supervisor perspectives. *Journal of Further and Higher Education, 25(1),* 97-106.

Symons, M. (2001) Starting a coursework postgraduate degree: The neglected transition. *Changing Identities Conference*. Retrieved March 11, 2010, from the University of Wollongong website: http://learning.uow.edu.au/LAS2001/unrefereed/ symons.pdf

Tobbell, J. & O'Donnell, V. (2013a). Entering Postgraduate Study: A Qualitative Study of a Neglected Transition. *International Journal for Cross-Disciplinary Subjects in Education, 4(1),* 1052 -1059. doi:10.20533/ijcdse.2042.6364.2013.0149 159 (2013b). Transition to postgraduate study: postgraduate ecological systems and identity. *Cambridge Journal of Education, 43(1),* 123-138. doi:0.1080/0305764X.2012.749215

Tobbell, J., O'Donnell, V.L., & Zammit, M. (2010). Exploring transition to postgraduate study: Shifting identities in interaction with communities, practice and participation. *British Educational Research Journal, 36(2),* 261–278.

Vilkinas, T. (2008). An exploratory study of the supervision of ph. d./research students' theses. *Innovative Higher Education, 32(5),* 297–311.

West, A. (2012). Formative evaluation of the transition to postgraduate study for counselling and psychotherapy training: Students' perceptions of assignments and academic writing. *Counselling and psychotherapy research, 12(2),* 128–135.

Winne, P. H., & Hadwin, A. F. (1998). *Studying as self-regulated learning.* In D. J. Hacker, J. Dunlosky, & A. C. Graesser (Eds.), *The educational psychology series. Metacognition in educational theory and practice* (p. 277–304). Lawrence Erlbaum Associates Publishers.