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1. Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is known as one of the most common special educational needs encountered by schoolteachers (Barkley, 1998). It was estimated that there is at least one child with ADHD in each classroom (Barkley, 1990). The prevalence rate of ADHD is 5.29% globally (Polanczyk, Silva, Lessa, Biederman, & Rohde, 2007).

These years, because of the development of inclusive education introduced by the Education Bureau, more and more students with special education needs entered the mainstream school. Thus, teachers' chances to get in touch with ADHD students had greatly increased. Apart from the parents or primary caregivers, teachers are the ones who spend most of their time with students (Cooper & O'Regan, 2001). They play an essential role in supporting ADHD students to encounter both academic issues and personal development (Liang & Gao, 2016).

However, classroom instruction can be challenging for teachers, especially with ADHD students during the lesson (Hepp, 2009; Fabiano & Pelham, 2003). For those pre-service teachers who have limited experience in teaching, they might find it more difficult when they get in touch with ADHD students. Although there are some courses provided by the University that introduced basic knowledge of special education needs in Hong Kong for pre-service teachers, some people have reserved reservations about the usefulness of those training. From previous research done in Hong Kong, some pre-service teachers mentioned that they did not learn much practical knowledge about addressing the needs of ADHD students from the universities course. Furthermore, the actual obstacles they may face in school are quite different from what they had been taught in training (Liang & Gao, 2016).

In this research, it would provide an analysis of the most updated situation in Hong Kong about how training can affect the knowledge and attitude of pre-service teachers towards ADHD students. At the same time, this study would give out some recommendations for the university to improve the current practices for the training. For the reason why knowledge and attitude would be discussed in this report, it was believed that these two aspects were comparatively easy to be assessed, and it was relatively related to training and experiences. Also, pre-service teachers' knowledge and attitude towards ADHD would directly affect their teaching process. If teachers have a poor understanding of ADHD, they might not know how to deal with ADHD students. At the same time, if a teacher holds a negative view towards ADHD, it might negatively influence students with ADHD.

2. Literature review

In the following, to have a better understanding about Hong Kong's situation towards ADHD students in local secondary schools, I will provide some basic information about the ADHD students situation in Hong Kong through the literature review, including the definition and prevalence of ADHD, pre-service teacher's knowledge, and attitude towards ADHD students in Hong Kong.

2.1 Definition and prevalence of ADHD

Attention deficit hyperactivity disorder (ADHD) is a common behavioral disorder that inhibits behaviors, motivation, sustained attention, and effort (Barkley, 1998) and is viewed as a “disruptive neurodevelopmental disorder associated with brain malfunction and a defect in response inhibition” (Bekle, 2004). It often leads to behavioral problems in different places or situations, for example, school, family, social, and work (Cheung, Wong, Ip, Chan, Lin, Wong & Chan, 2015). In Hong Kong, the prevalence rate of ADHD is about 6% in childhood and 4% in early adolescents (Lam & Ho, 2010; Leung & Mak, 2010; Leung et al., 2008). Because of the prevalence of ADHD in Hong Kong, there has been arising concern about how teachers, especially the pre-service ones, perceive ADHD and the provision of their training.

2.2 Pre-service teacher's knowledge toward ADHD after training

In Bekle's research (2004), the average percentage of the correct answer for pre-service teachers' knowledge shown on the K-ADHD scale ranged from 75.6% to 77% (Bekle, 2004; Jerome, Washington, Laine, & Segal, 1999; Anderson, Donnah, Watt, Susan, Noble, William, & Shanley, Dianne C., 2012). In 2016, a research done by Liang & Gao, showed that Hong

Kong's pre-service teachers had inadequate knowledge towards ADHD even after 4-years of training received in university. The average correct answer percentage for K-ADHD was low, which was 67.52, about 10 percent lower than in other countries. The situation in Hong Kong was unexpected and comparatively negative.

On the other hand, in previous research, it was found that some common misconceptions about ADHD exist (Jerome, 1999). For example, nearly 70% of the participants believed that students with ADHD will outgrow the disorder and become normal adults. At the same time, more than half of the participants answered incorrectly that they believed children with ADHD could do better if they try harder (Liang & Gao, 2016).

After 20 years passed, the result in Hong Kong showed that pre-service teachers still lack information about ADHD. It was believed that more information should be provided to the pre-service teacher since teachers with a better understanding of ADHD can work together with parents to offer satisfactory management solutions (Barkley, 1990; Dulcan & Benson, 1997; Bekle, 2004). Also, having more information about ADHD can increase teachers' confidence in teaching and managing students with ADHD (Keetam, 2013). It is believed that except knowledge level would change after training, pre-service teachers' attitudes would also change.

2.3 Pre-service teachers' attitude towards ADHD after training

By referring to the tripartite model of attitude, attitude is based on or consists of three components, including cognition, affect, and behavior (Eagly & Chaikem, 1993). From Bekle research (2004), it suggested that teachers' teaching styles and attitudes can directly influence ADHD students' progress. In another word, if teachers held a negative feelings or attitudes

toward students with ADHD, it would lead to a negative influence on students, for example, students may have poor social perception (Sherman, Jody, Rasmussen, Carmen, & Baydala, Lola, 2008).

Oppositly, Teachers with a positive attitude can bring positive impact on student success (Sherman, Jody, Rasmussen, Carmen, & Baydala, Lola, 2008). Therefore, the pre-service teacher should involve positive academic expectations, clarity in giving directions, patience, firmness, consistency, and acceptance of their teaching style towards ADHD students (Grynkewich, 1996; McCauley & Johnson, 1993).

However, most teachers usually hold more negative attitudes toward students who are below average in abilities and achievement (Bay & Bryan, 1991), especially those students who have special educational needs. In the previous study done in Hong Kong, it showed that all interviewed pre-service teachers gave out negative attitudes toward students with ADHD and considered them as a burden in class (Liang & Gao, 2016). It was believed that teachers' attitudes would be affected by serval factors.

Besides talking about knowledge level, pre-service teachers' attitudes were also related to training and experiences (Liang & Gao, 2016). Participants with more training received would usually have a higher sense of professional responsibility and self-efficacy beliefs in dealing with students with ADHD. From Bekle's research (2004), the result showed that participants with an increased level of training had improved their attitude scores. Also, participants with high scores on knowledge showed a positive attitude toward ADHD.

Most of the studies focus on pre-service teachers in primary school instead of secondary school. (Liang & Gao, 2016). It was meaningful for investigating 'how training affects pre-service secondary school teachers' knowledge and attitude in Hong Kong. This study will focus on how the local training institute impacts pre-service teachers' knowledge and attitude. The findings in the current study would be important for informing teacher educators in helping pre-service teachers evaluate and support ADHD students. As pre-service teachers, it was believed that we should be familiar with how to deal with students with different educational needs while we were receiving training in undergraduates. This project could let pre-service teachers better understand themselves and the limitation of the training course provided by the institute. The pre-service teachers could improve themselves before graduation, and the training institute could adjust their teaching method for the training course.

3. Research Questions and Hypotheses

The main research question for the project was “How teacher training is related to Hong Kong pre-service secondary school teachers’ knowledge and attitude towards Attention-deficit Hyperactively Disorder (ADHD).”

To narrow down the question, there will be three research questions with hypotheses for this project, including:

1. How is the pre-service teacher received training on ADHD related to their understanding of ADHD?

Hypothesis: Pre-service teachers who received training (SED3001) have a higher understanding of ADHD than those who do not.

2. How does the pre-service teacher receive training on ADHD related to pre-service teachers’ attitudes towards students with ADHD?

Hypothesis: Pre-service teachers who had received training show a more positive attitude towards ADHD.

3. How overall pre-service teacher training is related to their understanding and attitudes towards ADHD based on their interrelations?

Hypothesis: Both knowledge and attitude would be affected by training. The pre-service teachers who have received training before are usually more knowledgeable and have a more positive attitude toward ADHD.

4. Research method

4.1 Participants

4.1.1 Background

Both qualitative and quantitative research methods would be used in this research. For quantitative research, a questionnaire would be used. While for the qualitative research, the interviews would be used. For the participants, undergraduate students who are majoring in Education programs for secondary school will be invited. All of the participants would be coming from the Education University in Hong Kong. This University is a well-known institute that provides training for pre-teachers at different levels, including kindergartens, primary school, and secondary school. One of the courses about special education needs provided in the University would be SED3001, all the undergraduate students must complete this course before graduating. Students who had completed the course SED3001 or not would be the targeted participants for the research.

4.1.2 Pre-service Training provided in University for undergraduate

Students who study in the Education Program are required to complete the course SED3001 before graduation. The course title is School Guidance and Managing Diversity, under the Special Education and Counselling Department. The course aim at helping students “develop a caring, understanding and supportive attitude and a respect for diverse needs of students” and understand the theoretical foundations of diversity in ability. In the course, information about ADHD is provided in mass lectures, tutorials, and online activities.

4.1.3 Sample Size

The targeted sample size for the questionnaires is 60 (or more), while 30 have not attended the course SED3001, and 30 of them had completed the course. There will be at least five students for the interview part for being the participants.

4.2 Methodology

The mixed-research method will be used in the project. For quantitative research, questionnaires will be used. For qualitative research, an interview will be used.

4.2.1 Questionnaires

There are two parts for the questionnaires. Data will be collected by using the online platform Google Forms. For the first part, it contains multiple-choice questions on demographic background, including age, sex, year of study, and the program recently studying in.

For the second part, it aims at checking participants' understanding about Attention-deficit Hyperactivity Disorder. Knowledge of ADHD Scale (K-ADHD), which was designed by Jerome, Gordon, and Hustler (1994) to survey teachers' general knowledge concerning ADHD, will be used. Questions in true-false response format about diagnosis and treatment of ADHD are given to participants (see Appendix 1), and the correct answer percentage is calculated. The questionnaire is conducted in English and uses the exact wordings in K-ADHD. No translation is given to avoid participants' misunderstanding of the questions caused by translation and to ensure the accuracy of the result. There are 19 items in total, with 1 question excluded since it is irrelevant to the Hong Kong situation. The questions can be grouped according to the following themes: biological and nonvolitional factors, family influences, causation, medical and educational interventions, and ADHD myths (Bekle, 2004). Originally, question 20 was "ADHD occurs more in minority groups than in Caucasian groups." However, since Caucasian is not one of the major minorities in Hong Kong, the question is not relatable to the Hong Kong context. In the study by Ohan et al. (2008), question 20 was also excluded from the questionnaires to prevent misinterpretation of the answer (Lee, 2017). The K-ADHD scale was used in the study since its internal reliability

provided a good result in the value of 81 (Hepp, 2009), which is desirable because the unshared error is reduced in scale scores (DeVellis, 2003).

After collecting data from the questionnaire, pre-service teachers' knowledge towards ADHD will be analyzed according to the number of correct answers from participants.

4.2.2 Interview

The interview aims at collecting information from the participants about their attitude toward ADHD and the training they received from the undergraduate program about special education needs or ADHD. Participants are chosen randomly from the questionnaires part. The interview is set as a semi-structured form, pre-set questions with follow-up questions depending on the interviewee's responses will be asked during the interview. As Chinese is the first language of most of the participants selected in the study, the questions are designed in Chinese. Each interview is approximately 15-20 minutes, with 5-7 questions. By referring to Bekle's research about teachers' attitudes toward ADHD (2004), the same question, "What is your attitude towards ADHD children?" is asked as one of the questions participants need to answer on a seven-point scale from "favorable" to "unfavorable." Other questions can refer to in Appendix II.

The interview part focuses on investigating the changes in participants' knowledge and attitude after training. Also, it is used for investigating the effectiveness of the training provided by the undergraduate program.

4.3 Method for Data Analysis

For the result of the questionnaires, an independent T-test will be performed. To ensure participants' privacy, raw data from the questionnaires were coded. In addition, Thematic Analysis will be used for data analysis for the interview part. Then, the result from the interview will then be analyzed together with the result from the questionnaires to investigate how training affects participants' knowledge and attitude toward ADHD.

4.4 Procedures

Pre-service teachers who are recently studying in EdUHK were recruited through emails, social networking, and social networking software. The pre-service teacher could voluntarily sign up for participation in the study. As some participants may be concerned about their privacy and thus refuse to complete the survey (Brick & Williams, 2013), we promise all the participants that their responses will be kept confidential to enhance the response rate.

5. Data Analysis

5.1 Quantitative Data Analysis

Statement	Correct Answer	Group A (Control Group) Participant who has not completed SED3001 (n=20) (%)	Group B Participant who had completed SED3001(n=20) (%)
1. ADHD can be caused by poor parenting practices	False	60	60
2. ADHD can often be caused by sugar or food additives	False	63	54
3. Children with ADHD are born with biological vulnerabilities toward inattention and poor self-control	True	87	86
4. A Child can be appropriately labelled as ADHD and not necessarily be over-active	True	83	83
5. Children with ADHD always need a quiet, sterile environment in order to concentrate on tasks	False	23	51
6. Children with ADHD misbehave primarily because they don't want to follow rules and complete assignment	False	67	63
7. The inattention of children with ADHD is not primarily a consequence of defiance, oppositionality and an unwillingness to please others	True	73	66
8. ADHD is a medical disorder that can only be treated with medication	False	63	74
9. Children with ADHD could do better if they only would try harder	False	50	63
10. Most children with ADHD outgrow their disorder and are normal as adults	False	20	31
11. ADHD can be inherited	True	83	66
12. If medication is prescribed, educational interventions are often unnecessary	False	77	77
13. If a child can get excellent grades one day and awful grade next, then he/she must not have ADHD	False	83	86
14. Diets are usually not helpful in treating ADHD	True	37	49
15. If a child can play Nintendo for hours, he/she probably isn't ADHD	False	90	83
16. Children with ADHD have a higher risk for becoming delinquent as teenagers	True	30	51
17. Children with ADHD are typically better behaved in 1-to-1 interactions than in a group situation	True	67	77
18. ADHD often results from a chaotic, dysfunctional family life	False	57	74
19. ADHD occurs equally often in girls and boys	False	47	66

Table 1 - The participants' knowledge about ADHD

During the research, participants had to answer 19 true/false questions from the questionnaires (refer to Appendix I). The data from the participants were divided into groups: group A who had not yet studied SED3001, as known as the control group, and group B, who had completed the course SED3001. Two data groups would be compared to determine their knowledge level about ADHD. Then, an independent t-test would be performed to determine the differences between the two groups of participants in the knowledge about ADHD.

No significant difference was found in the study, $t(65) = 0.79$, $p > .05$. According to the correct answer scores, group A participants ($M=11.53$, $SD=2.06$) had quite a similar result compared with group B participants ($M=12.6$, $SD=2.66$). Although the mean score for group B was slightly higher than group A about 1.07, no significant difference was found.

20 questions were group into five categories (Bekle, 2004): biological and nonvolitional factors (questions 3, 6, 7 and 9), family influences (questions 1 and 18), causation (questions 11 and 19), medical and educational interventions (questions 5,8,12 and 17), and ADHD myths (questions 2,4,10,13,14,15 and 16).

Biological and nonvolitional factors

Most of the participants agreed that ADHD was biologically caused. For the statement ‘Children with ADHD are born with biological vulnerabilities toward inattention and poor self-control’, over 85% of participants (Group A: 87%; group B: 86%) answered true correctly. It showed that most of the participants understood that people who have ADHD were innate. 67% from group A and 63% from group B answered correctly that the statement ‘children with ADHD misbehave primarily because they do not want to follow rules and complete assignment’ was false. 73% of participants from group A and 66% of participants from group B agreed that ‘The inattention of children with ADHD is not primarily a consequence of defiance, oppositionality and an unwillingness to please others.’ It seems that participants understood that ADHD students did not mean to misbehave. However, from the statement ‘Children with ADHD could do better if they only would try harder’, the number of participants who answered false correctly was lower than the previous statement, with only 50% participants from group A and 63% from group B. Most participants agreed that although ADHD students were not misbehaving on purpose, they could do better if they try harder, which means a large proportion of the participants misunderstood that ADHD students could control their behavior. It is believed that since the training course did not provide many real-life experiences or case studies to the students, participants may have some misunderstanding towards ADHD, especially for the nonvolitional factors.

Family influences

40% of all the participants answered incorrectly that they believed ‘ADHD can be caused by poor parenting practices’. Similarly, 43% from group A and 26% from group B responded to the statement incorrectly and believed that ‘ADHD often results from a chaotic, dysfunctional family life’. From my point of view, since the course SED3001 had a tight schedule that students had to be familiar with the diverse needs of students in all school settings, there was only limited time for introducing the characteristics of ADHD students. When mentioning the information about ADHD, the family factor may not be emphasized in this part. Thus, students may not get much information about the family influences on ADHD.

Causation

For the statement ‘ADHD can be inherited’, participants from group A (83%) had a higher correct percentage than group B (66%). However, more participants in group B (66%) answered false correctly in the statement ‘ADHD occurs equally as often in girls as in boys’ than participants in group A (47%). It is shown that even though participants had received training before, it did not mean that they had a better understanding towards the causation of ADHD compared with those who had not. The training course provided by the university may not be effective at raising students’ knowledge towards ADHD’s causation. Some participants might have basic knowledge about the causation of ADHD through the internet.

Medical and educational interventions

For the statement ‘ADHD is a medical disorder that can only be treated with medication’, most participants disagreed with these two statements, group A had 63%, group B had 74%. Both groups A and B had 77% of participants disagreed with ‘If medication is prescribed, educational interventions are often unnecessary’. On the other hand, most participants believed that ‘Children with ADHD are typically better behaved in 1-to-1 interactions than in a group situation’. In contrast, group A had 67%, and group B had 77% of the participants. But for the statement ‘Children with ADHD always need a quiet, sterile environment to concentrate on tasks’, a large proportion of participants showed a misunderstanding of this part, no matter participants in group A or group B, only 23% and 51% of participants could answer correctly. In this part, it was found that participants who had already completed SED3001 were more familiar with medical and educational interventions of ADHD. As the training course, SED3001 had provided a foundation study in guidance and counseling and diversity in the school setting, pre-service teachers learned some interventions and methods of classroom management during the course. Thus, it showed that the training course SED3001 might positively impact pre-service teachers’ knowledge of ADHD in this part.

ADHD myths

A lot of the participants had some misunderstanding about ADHD, especially for the statements ‘most children with ADHD will not outgrow their disorder and are normal as adults’ and ‘diets are usually not helpful in treating ADHD’, only 20% and 37% of participants in group A and 31% and 49% of participants in group B could answer correctly. Some participants believed that eating habits would lead to ADHD; for example, only 63% in group A and 54% in group B disagreed that ‘ADHD can often be caused by sugar or food additives’. At the same time, both group A (30%) and group B (51%) participants showed little understanding of the statement ‘Children with ADHD have a higher risk for becoming delinquent as teenagers’. However, in some statements, no matter participants from groups A or B, they have shown a certain understanding of ADHD in some aspects. For instance, 83% of group A participants and 86% of group B participants disagreed that ‘If a child can get excellent grades one day and awful grade next, then he/she must not have ADHD’. Similarly, 83% of participants in group A and group B agreed that ‘A Child can be appropriately labelled as ADHD and not necessarily be over-active’. 90% of participants in group A and 83% of participants in group B disagreed that ‘If a child can play Nintendo for hours, he/she probably isn’t ADHD’. Since the training course was not only focused on the information of ADHD, but also different special educational needs could be found in school, including visual and hearing impairments, physical disabilities, autism spectrum disorder, dyslexia, etc., pre-service teachers might mix up the characteristics of the special educational needs. At the same time, the content about ADHD was very limited because the course required pre-service teachers to understand most of the needs of diverse learners in Hong Kong. Also, the information on the internet about ADHD sometimes might not be accurate, so participants might be misled by that information about ADHD myths.

To conclude, in referring to the first research question, ‘How is the pre-service teacher received training on ADHD related to their understanding of ADHD?’, there was a statistically significant, though modest, difference between the two group scores. The mean score of group B participants (who had completed SED3001) was slightly higher than group A participants. Moreover, participants who had completed SED3001 demonstrated a better understanding of some questions compared with the research done by Liang & Gao in 2016. Thus, it was believed that the training course provided by the university might bring a positive influence on pre-service teachers’ understanding of ADHD to a certain extent, but the effectiveness was not significant.

5.2 Qualitative Data Analysis

For the interview part, there were seven questions for this part (refer to Appendix II). There were five participants did interview in the study. Only participant T had not attained SED3001 before, while the other four participants (B, E, R, and K) had completed SED3001. The scripts for the interview were attached in Appendix III.

Knowledge towards ADHD

In question 1, ‘Have you ever attended any course or activities introducing ADHD in university (except SED3001)?’, most of the participants had not attained any course or training about ADHD (except SED3001) in the University before, except participant K. Participant K pointed out that she had participated in a talk about ADHD knowledge in the university two years ago. The talk consisted of four sessions; students could register on their own if they were interested in the talk:

I remember that the talk is about how to deal with students with ADHD. In the talk, there was a guest who was had ADHD shared his point of view with us. (Participant K)

The talk provided a chance for the participant to learn more about people with ADHD. Especially for the guest session, it is believed that the real-life sharing could be helpful for enhancing pre-service teachers’ knowledge base about ADHD and building up empathy towards students with ADHD.

In question 2, ‘How much do you think you know about ADHD? (1= The least, 7= The most)’, except for participant T, who had not completed SED3001 yet gave 2 out of 7 points, other participants believed themselves are pretty familiar with ADHD (participant E, K: 4 points, participant B, R: 5 points).

...4 points. I don't know much about ADHD, but I think I have some basic knowledge about this. (Participant E)

It was believed that most of them had basic knowledge towards ADHD. It was thought that there might be two reasons to explain this. First, the training course provided by the university (SED3001) was helpful for enhancing pre-service teachers' knowledge towards ADHD. Secondly, participants got the information by themselves, such as by searching on the internet or attaining activities outside the school.

Attitude towards ADHD students

Most of the participants hold neutral or positive attitudes towards ADHD. Participants B, K, R, and T believed that ADHD students are the same as other students, so they gave out points 4 to 5 in ‘What is your attitude towards ADHD children? (1= The most unfavourable, 7= The most unfavourable)’ and said that they hold a neutral attitude towards those students:

They (students with ADHD) are just the same as other students. I think both teacher and parents should not label their students as having special educational needs. We should treat them fairly like other students. (Participant K)

Only participant E gave 3.5 out of 7 in this question. However, participant E mentioned that he did not hold a negative view toward ADHD students:

I think they (ADHD students) are special compare with other students. They may have difficulties to concentrate. But I don't hold much negative view towards them.

(Participant E)

On the other hand, participants who were more knowledgeable about ADHD were more confident and willing to teach ADHD students. Participants who had attended some courses about ADHD before (except SED3001) felt more confident in teaching ADHD students. In the interview, there was a question 'Are you confident in teaching ADHD students? (1=Very unconfident, 7=Very confident)'. Participants B, K, R, and E gave out 4 points or above in this question and mentioned that they were pretty confident in teaching ADHD students because they had a basic understanding about ADHD through different ways:

I will give it 5 out of 7. I learned some skills about dealing with ADHD students two years ago through a talk organized at the university. (Participant K)

Although participant B mentioned that she had not taught any ADHD student before, she still gave point of 5 in this question because she had participated in a course about ADHD before:

I am quite confident to teach them because I had attained a course before, and I had done some research by myself. (Participant B)

Similarly, participant E also claimed that he was not very confident in teaching students with ADHD, but still, he gave 4 out of 7 in this question because he believed that he had some basic knowledge towards ADHD.

Oppositely, participant T, who claims himself only have very limited knowledge towards ADHD, only gave out 3 points on this question:

I think I cannot teach ADHD students well because I don't have enough knowledge towards ADHD, and also, I am not patient enough. (Participant T)

It showed that participants who were more knowledgeable towards ADHD were more confident in teaching ADHD students.

Referring to the second research question, 'How is the pre-service teacher received training on ADHD related to pre-service teachers' attitudes towards students with ADHD?', it was believed that pre-service teachers held a more positive attitude towards ADHD students after understanding more information about ADHD. Receiving training on ADHD in the university (taking SED3001) would be one of the ways to enhance their understanding. The course not only provided fundamental knowledge about ADHD to pre-service secondary school teachers but also provided some useful skills for classroom management towards ADHD students. Although most of the participants in the research claimed that the content in the training course SED3001 was not comprehensive at all, they believed that there was something new they could learn from the course which could enhance their confidence in teaching ADHD students.

Training course provided in the University (SED3001)

A large proportion of the participants believed that the course did not help much for them to know more about ADHD.

Actually, I can barely remember what I have learned from the course about ADHD.

(Participant B)

...the course was not only focused on ADHD, and it only provided a very limited information about ADHD. (Participant E)

The contents of the course are quite confusing because it taught a lot of technique and characteristic of students with special educational needs... I think I had mixed them up together. (Participant R)

Both participants B, E, and R, pointed out that course SED3001 might not be effective at all in raising students' understanding about ADHD. It was believed that since the course covered not only the information about ADHD, the pre-service teacher might not have enough time to learn about ADHD and might even mix up the content from other special educational needs. Yet, some of the participants pointed out that the training course was helpful in teaching some skills on how pre-service teachers could do to handle ADHD students:

Although the course did not talk much about the symptoms of ADHD and the strategy for teachers to deal with ADHD students, it taught some counseling skills on how to deal with students with special education needs. (Participant K)

It showed that different participants hold different views towards the training course provided by the institute. Although most of the participants believed that the course might not be effective in enhancing their knowledge of ADHD, some participants thought that the course affected their knowledge level or attitude.

Changes in attitude after training (SED3001) in the university

Regarding the attitude changes after the SED3001, some participants believed that the course could have some positive influence on their attitude towards ADHD. In contrast, a large proportion of the participants mentioned that they had no changes after the course.

Participant B mentioned that her attitude towards ADHD students had slightly changed after the training course. Before knowing much about ADHD, she hold a negative view towards ADHD students. She believed those students were ‘naughty and uncontrollable.’ But after understanding more about ADHD:

...especially knowing that ADHD students are not behaving badly deliberately but because they cannot control themselves (Participant B)

Participant B became more positive towards ADHD students and believed that when dealing with ADHD students, teachers should be more patient and try to build up empathy.

Some participants remain unchanged in attitude after understanding more about ADHD:

Even though I understand that ADHD students cannot control themselves, I still don't want to teach them or contact them. I think it will be a little bit messy to deal with ADHD students. (Participant E)

It showed that his attitude remained negative both before and after understanding more about ADHD. On the other hand, participants K and R both remained neutral towards ADHD students after attending SED3001 and believed that ADHD students have no different compared with other students:

I always thought that being a teacher, we should not label any students. We should treat every student fairly. (Participant K)

It was believed that the changes brought by the training course was based on different people. Some participants had changed their attitude after attending the course, while some remained unchanged.

To conclude, from the quantitative research, the pre-service teacher with a better understanding of ADHD were more confident in teaching ADHD students. They usually learn more information by themselves, such as participating in a talk at the university, attaining courses outside the university, or doing research through the internet. However, there was no significant correlation between how SED3001 changes one's attitude or viewpoint towards ADHD. Only participant B changed her attitude from negative to slightly positive, while other participants remained unchanged towards students with ADHD.

Regarding the third research question, 'How overall pre-service teacher training is related to their understanding and attitudes towards ADHD based on their interrelations?', it was believed that overall, the training course SED3001 provided in the University could enhance pre-service teacher's understanding towards ADHD students in some extent as mentioned above. However, the effectiveness was very limited. The training course SED3001 might change pre-service teachers' attitudes towards ADHD, but it was not inevitable since the attitude changed mainly based on people understanding towards ADHD. Some pre-service teachers had learned the information about ADHD in different ways. For example, by doing research on their own or participating in other activities about ADHD, their attitude towards ADHD might remain unchanged towards ADHD.

5.3 Conclusion for the data analysis

The founding of the study proved that there is no significant correlation between how training affects participants' knowledge towards ADHD after calculation. But the data showed that the mean score from those participants who had completed SED3001 was higher than those who had not. Referring to the first sub-research question, the result showed that teachers who received training had a higher understanding than those who did not. On the other hand, referring to the quantitative research, most of the participants pointed out that SED3001 let them learn more about ADHD to a certain extent. Some participants even changed their attitude towards ADHD after the training course. However, not all the participants had changed their attitude after training. Some of them remained unchanged. Referring to the second sub-research question, the result showed that the training course might bring different changes to different pre-service teachers. Overall, referring to the third sub-research question, the result showed that pre-service teachers who received training before were more knowledgeable towards ADHD. For some of them, their attitude towards ADHD had changed after the training.

By referring to the main research question of this study, “How teacher training is related to Hong Kong pre-service secondary school teachers’ knowledge and attitude towards Attention-deficit Hyperactively Disorder (ADHD),” perhaps, although the training course provided by the university might not be successful in leading the significant improvement of pre-service teachers’ understanding towards ADHD, we could not deny that the training course did make some changes in participants’ knowledge and attitude in overall. At the same time, training course could affect one’s attitude towards ADHD, however, it varied from person to person.

6. Discussion

Pre-service teachers' knowledge towards ADHD

According to the result above, both group A and group B participants had a lower percentage of correct answer scores (group A: $M=60.7$, group B: $M=66.3$) than in the previous study. In Liang & Gao's analysis (2016), the correct average percentage of correct answer scores for pre-service teachers was $M=67.52$, which was higher than the result shown in this study. Meanwhile, in Bekle's research (2004), the average percentage of the correct answer for pre-service teachers' knowledge shown on the K-ADHD scale ranged from 75.6% to 77%, which was nearly 10% higher than the result from this research. It showed that pre-service teachers in Hong Kong still had inadequate knowledge towards ADHD compared with previous results done in other countries, and it seems that there was a deterioration in pre-service teachers' knowledge towards ADHD compared with the research done five years ago. Although the pre-service teacher in Hong Kong had completed some training courses about special education needs in their university (e.g., SED3001), their knowledge level towards ADHD was still unexpected and comparatively negative. From my point of view, although pre-service teachers could get more information about ADHD through the internet recently, like what participant R did before, sometimes there might be false information shown on the internet, which might be misleading. That incorrect information could lead to the deterioration of pre-service teachers' knowledge towards ADHD.

Meanwhile, regarding Bekle's research (2004), it suggested that although the training course could provide a knowledge base on ADHD to the pre-service teacher, there were some knowledge gaps exist. Especially for the part about ADHD myths, it showed that pre-service teachers still had some misconceptions about ADHD. Similar to what Jerome et al. (1999) found,

there were still common misconceptions about pre-service teachers towards ADHD. From the result above, nearly 70% of the participants answered incorrectly in question 10 and believed that ‘most children with ADHD outgrow their disorder and are normal as adults’. Also, in question 2, about half of the participants answered incorrectly in question 2 and believed that ‘ADHD can often be caused by sugar or food additives’. Perhaps the reason why pre-service teachers still had some misunderstandings towards ADHD was because the training course had not emphasized the common misconceptions. Since SED3001 introduced most of the common special educational needs in Hong Kong at the same time, tutors could not have enough time for introducing the details about the common misconceptions.

However, for some questions, participants in this study demonstrated a better correct percentage than the result done in 2016. For question 9, ‘children with ADHD could do better if they only would try harder’, 50% from group A and 63% from group B from this study answered false correctly. In contrast, in previous research, only 41% of the pre-service teacher could answer correctly. In question 14, 49% of the participants answered true correctly that ‘Diets are usually not helpful in treating ADHD’, while in 2016, only 25% of the pre-service teachers could answer it correctly (Liang & Gao, 2016). Similarly, in question 16, ‘Children with ADHD have a higher risk for becoming delinquent as teenagers’, 51% of participants answered false correctly. In contrast, in 2016, only 20% of the participants could answer the correct answer. It showed that there was an unobvious improvement in pre-service teachers’ knowledge towards ADHD on specific questions. It showed that the training course SED3001 might help pre-service teachers to enhance their knowledge towards ADHD in some specific aspects. In the training course, there were case studies and role-play for letting the participants know more about students with special educational needs. Those activities might be helpful in enhancing pre-service teachers’ understanding of ADHD. By introducing real-life situations and

participating in real-world scenarios, participants could apply and develop the actual skills required to handle the problem immediately. The lecture might strengthen participants' impressions towards the topics.

Pre-service teachers' attitude towards ADHD

This study corroborated earlier findings from Austria (Bekle, 2004) that pre-service teachers' attitude toward ADHD and their knowledge base was closely related. Exposure to up-to-date information and its implications for realistic and effective intervention would change one's rejecting or negative attitudes (Bekle, 2004). Referring to the result from the interview, the pre-service teacher who had a better understanding of ADHD usually appeared to be more acceptance towards ADHD students. After getting more information about ADHD, pre-service secondary school teachers built up empathy towards students with ADHD and held a neutral or positive attitudes toward them:

I held a neutral attitude towards them (students with ADHD) because I understood that ADHD was congenital. Also, those students who behaved badly was because they could not control themselves. I know that there were many interventions nowadays.

(Participant B)

Regarding to Liang & Gao's research in 2016, a similar result was found. Participants who had learned some practical skills for handing special educational needs students or had successfully taught those students before displayed confidence in teaching ADHD students. One of the in-service teachers even claimed that 'students with ADHD can be very responsible and even gifted if you understand them and trust them' in the previous research. From my point of view, after understanding more information about ADHD, especially knowing the skills for dealing with

ADHD students, participants would be more confident when communicating or teaching ADHD students. Furthermore, after realizing ADHD students were not intentionally behaving poorly but could not control themselves, participants might build up empathy towards them and would be more willing to accept them instead of holding negative feelings, like labeling ADHD students as naughty or annoying.

Effectiveness of the compulsory training course (SED3001) provided in the University on enhancing pre-service teachers' knowledge towards ADHD.

Bekle's research (2006) found that practicing teachers in Australia received 'very little ADHD training as part of their university studies'. The knowledge about ADHD was only briefly as part of their overall teacher training. Similarly, in Hong Kong, the course SED3001 was the only one compulsory course provided by the University to the pre-service teachers. The course introduced different special educational needs at the same time, which might lead to confusion to the pre-service teachers:

Since the course (SED3001) not only focused on ADHD, there was very limited time for us to learn more about ADHD. (Participant K)

...however, the course only had very little amount of time to talk about the information about ADHD, most of the time was, introducing different special educational needs at school; I think it was pretty confusing. (Participant R)

Although there were other courses or activities organized by the University about special educational needs which undergraduate students could participate voluntarily, only a few students would participate.

Suggestion

After receiving comments from the participants, it was believed that there was something that the compulsory training (SED3001) provided by the University could revamp to enhance its effectiveness.

Perhaps, adding more real-life experiences in the training course can raise pre-service teachers' understanding towards ADHD students rather than only focusing on theoretical knowledge. Teachers are required to transform their knowledge into workable plans and strategies (Mioduser, Margalit, & Efrati, 1998). Although the course already provided case studies and role-plays for the participants, it might not be sufficient to enhance one's knowledge or skills. By adding block practice or talk in the course, pre-service teachers can have a chance to teach or contact students with special educational needs. As mentioned by participant K, first-person experience sharing could be inspirational. Knowledge and attitudes to ADHD would be improved with the number of ADHD students taught (Bekle, 2004). In other words, letting pre-service teachers learn from the realistic situation could enhance bring positive influence on both the knowledge and attitude part to the practicing teachers.

Limitations of the study

The research used a mixed-method study on pre-service secondary school teachers' knowledge about ADHD and attitudes towards students with ADHD. Regarding the sample size for both quantitative analysis (group A:31, group B:36) and qualitative research (group A:1, group B:4), the small sample size might limit the study's statistical conclusion validity. Although the result proved that there might not have a significant positive or negative correlation between the training courses provided at the university and participants' knowledge level or attitude towards ADHD, it was suggested that there might be other contextual factors that influenced the result. For instance, identify experiences or other contextual factors. 'Chinese cultural beliefs might help explain some of the inconsistencies in the results' (Liang & Gao, 2016).

One point should be noticed that the more extensive experience in the classroom may affect their understanding of students with ADHD (Bekle, 2004). Since some participants who had completed SED3001 may finish their block practice at a local secondary school before, the questionnaires used in quantitative research for assessing the effectiveness of the training course might not be accurate.

7. Conclusion

This study provided an analysis of the most updated situation in Hong Kong about how training can affect the knowledge and attitude of pre-service teachers towards ADHD students. Due to raising awareness on respect for the diverse needs of students in all school settings, the requirement for pre-service teachers' knowledge and skill for dealing with ADHD students was emphasized. This research invited two groups of pre-service teachers, including those who had completed the training course SED3001 or those who have not yet. From the result, we found that the training course offered by the university not only could enhance pre-service teachers' knowledge towards ADHD, but also might change one's attitude towards ADHD students. However, the result was slightly significant. It was believed that the training course could make some changes for the improvement, such as including a block practice section.

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Appendix I – K-ADHD scale

1. ADHD can be caused by poor parenting practices
2. ADHD can often be caused by sugar or food additives
3. Children with ADHD are born with biological vulnerabilities toward inattention and poor self-control
4. A Child can be appropriately labelled as ADHD and not necessarily be over-active
5. Children with ADHD always need a quiet, sterile environment in order to concentrate on tasks
6. Children with ADHD misbehave primarily because they don't want to follow rules and complete
7. The inattention of children with ADHD is not primarily a consequence of defiance, oppositionality and an unwillingness to please others
8. ADHD is a medical disorder that can only be treated with medication
9. Children with ADHD could do better if they only would try harder
10. Children with ADHD outgrow their disorder and are normal as adults
11. ADHD can be inherited
12. If medication is prescribed, educational interventions are often unnecessary
13. If a child can get excellent grades one day and awful grade next, then he/she must not have ADHD
14. Diets are usually not helpful in treating ADHD
15. If a child can play Nintendo for hours, he/she probably isn't ADHD
16. Children with ADHD have a higher risk for becoming delinquent as teenagers
17. Children with ADHD are typically better behaved in 1-to-1 interactions than in a group situation
18. ADHD often results from a chaotic, dysfunctional family life
19. ADHD occurs equally often in girls and boys

Appendix II – Interview Questions

1. 你曾否在大學中參與任何有關介紹 ADHD 的活動或課程？如有，該活動/課程的內容是什麼？

Have you ever attended any course or activities introduce ADHD in university (except SED3001)? If yes, What the course/activity about?

2. 你認為自己對 ADHD 的認識程度有多少？（1=最低，7=最高）

How much do you think you know about ADHD? (1= The least, 7= The most)

3. 你對 ADHD 的看法是？（1=最差，7=最好）請解釋你的評分。

What is your attitude towards ADHD children? (1= The most unfavorable, 7= The most unfavorable) Can you explain with reason?

4. 你有信心教導 ADHD 學生嗎？（1=十分沒有信心，7=十分有信心）

Are you confident in teaching ADHD students? (1=Very unconfident, 7=Very unconfident)

5. 假設在你教導的班別中有一名 ADHD 學生，你會怎樣做？

Assume that there is a student with ADHD in your class, what would you do?

*6. 你認為 SED3001 能夠有助你更認識 ADHD 嗎？為什麼？

Do you think SED3001 can help you understand more about ADHD? Why?

*7. 完成 SED3001 後，你對 ADHD 的看法有改變嗎？請解釋你的答案。

After taking SED3001, have your attitude towards ADHD changed? Please Explain.

(*Question 6 and 7 only suitable for participants who had finished SED3001)

Appendix III – Interview scripts

Participant B (had completed SED3001)

問：你曾否在大學中參與任何有關介紹ADHD的活動或課程？如有，該活動/課程的內容是什麼？

答：無。

問：你認為自己對ADHD的認識程度有多少？（1=最低，7=最高）

答：5分掛…因為我之前有上過關於ADHD既堂，所以都有認識既。

問：請問你所指既堂係咩堂黎架？可唔可以講多少少。

答：個班主要係講ADHD既，我記得大約好似一個鐘頭多少少左右啦。兩三年之前報架啦，唔係教大提供既，自己出面報名架。

問：你對ADHD的看法是？（1=最差，7=最好）請解釋你的評分。

答：中間，4分啦。因為我知道佢地其實係天生患有既，唔係後天而成。加上他們依加有方法可以去控制到病情，例如唔好食咁多糖同跟據醫生指示接受藥物治療等。

問：你有信心教導ADHD學生嗎？（1=十分沒有信心，7=十分有信心）

答：都有信心，我比5分啦！雖然我自己就無教過ADHD既學生，之前實習都無遇過，但都幾有信心既，因為我有係出面上過堂同埋自己都有上網做過下Research。

問：假設在你教導的班別中有一名ADHD學生，你會怎樣做？

答：首先我唔會安排佢地坐近窗邊/門口邊，唔想學生受到外界既騷擾。可能會安排佢同比較安靜的同學坐，都唔會想好似要孤立個位學生咁。同埋唔好阻止學生活動，可以試下同學生約法三章訂立規矩，Set個時間比佢去走動一下。

問：你認為SED3001能夠有助你更認識ADHD嗎？為什麼？

答：都有既，但比較淺層。因為課程內容不單一著重於介紹ADHD，所以沒有深入探討ADHD。我記得個Course 淨係有提到要盡量減少外界的騷擾，但就無講過話要食藥、會遺傳呢啲，呢啲都係我出面上堂先識架。我都唔太記得SED3001的課程內容啦，

問：完成 SED3001 後，你對 ADHD 的看法有改變嗎？請解釋你的答案。

答：有既，因為我知道咗 ADHD 的學生係唔能夠自己控制到自己。以前覺得他們好曳，唔知點樣去處理。再加上未有實質接觸過，都會比較擔心同唔希望遇到佢地。但認識咗更多之後就知道應該要有同理心，多從佢地既方向出發。

Participant E (had completed SED3001)

問：你曾否在大學中參與任何有關介紹ADHD的活動或課程？如有，該活動/課程的內容是什麼？

答：無啊。

問：你認為自己對ADHD的認識程度有多少？（1=最低，7=最高）

答：4分左右，唔算好深入，但我諗都冇一般認識既。

問：你對ADHD的看法是？（1=最差，7=最好）請解釋你的評分。

答：3.5分啦，中間。我覺得佢地比起其他學生特別少少，可能天生比其他人難集中，但無特別覺得負面或者正面。

問：你有信心教導ADHD學生嗎？（1=十分沒有信心，7=十分有信心）

答：4分，無乜信心可以教好佢地，同埋覺得唔知點做好，驚自己控制唔到佢地同會擔心佢地可能會跟唔上或者影響到其他學生。

問：假設在你教導的班別中有一名ADHD學生，你會怎樣做？

答：可能會放佢係側邊既位，因為擔心佢影響到其他人。但都會盡量安排佢坐前少少，可能對住老師枱可以令佢專心啲，或者咁老師都可以容易少少留意到佢

問：你認為SED3001能夠有助你更認識ADHD嗎？為什麼？

答：有，我知道多啲有關ADHD既知識，姐係例如佢地係天生既專注力不足問題，而且佢地未必可以控制得到自己

問：完成SED3001後，你對ADHD的看法有改變嗎？請解釋你的答案。

答：都有些少既，多啲體諒佢地，因為知佢地都唔想既。但係講真個句，都唔想遇到呢類既學生，唔想麻煩。

Participant K (had completed SED3001)

問：你曾否在大學中參與任何有關介紹ADHD的活動或課程？如有，該活動/課程的內容是什麼？

答：有啊，係CLP-11搞既講座。

問：介唔介意講多少少個講座既野啊？

答：個陣Year3係學校搞既，自己報名架，咩人都可以參加。我記得除咗學生之外，仲有現職老師、家長。個Talk總共有4場，唔同內容既，我聽咗2場。主要係講「如何教導ADHD的學生」，個陣仲有黃秋生做嘉賓添，有個ADHD協會的人訪問佢。

問：咁你係個講座內面有咩得著啊？

答：個嘉賓帶出咗個結論，就係家長同教師都好，唔應該刻意去標籤學生，應該比佢地自由發展，其實佢地同一般人無乜分別架咋。

問：你認為自己對ADHD的認識程度有多少？（1=最低，7=最高）

答：4分，我對病理上無太多既認識。雖然身邊有親戚就係ADHD，但都無乜認識。

問：你對ADHD的看法是？（1=最差，7=最好）請解釋你的評分。

答：4-5分，佢地同一般人無乜分別，所以就唔會特別有消極的看法，其實只要他們願意去努力，都可以做到一般人做到的事，就例如讀書成績咁，只係需要多少少時間和鼓勵。我記得中學有個同學有ADHD，個陣個老師好有耐性咁教佢同鼓勵佢，佢都好肯去努力，最後成績都幾好。

問：你有信心教導ADHD學生嗎？（1=十分沒有信心，7=十分有信心）

答：5分，都係覺得佢地同一般人無乜分別，好似平時咁教。

問：假設在你教導的班別中有一名ADHD學生，你會怎樣做？

答：營造良好既課堂氣氛。視乎情況啦，可能如果佢唔肯出聲，就多啲邀請佢答問題。就算佢有很多問題或者好多野講，都盡量會支持。

問：你認為SED3001能夠有助你更認識ADHD嗎？為什麼？

答：有啊，知道多咗ADHD既野。但其實我唔識點即時分辨到ADHD學生。不過課程都無乜教應對ADHD既技巧，姐係課堂上有咩可以直接幫到佢地，好似教學資源、教具咁，淨係有講少少輔導技巧。課程始終唔係重點講ADHD，講ADHD既時間都好少

問：完成SED3001後，你對ADHD的看法有改變嗎？請解釋你的答案。

答：無變。同本來一樣，都係覺得佢地同一般人無乜分別，無因為知道多咗而對他們有任何改觀。

Participant R (had completed SED3001)

問：你曾否在大學中參與任何有關介紹ADHD的活動或課程？如有，該活動/課程的內容是什麼？

答：無。

問：你認為自己對ADHD的認識程度有多少？（1=最低，7=最高）

答：5分，我自己有做過Research。

問：你對ADHD的看法是？（1=最差，7=最好）請解釋你的評分。

答：我應該會比5分，都偏正面既，我覺得佢地同一般人無乜太大分別，都唔應該話要刻意標籤或者歧視佢地。

問：你有信心教導ADHD學生嗎？（1=十分沒有信心，7=十分有信心）

答：4，都有信心既，但始終未試過實際遇到ADHD學生，所以覺得會好多未知數，擔心自己唔識去應對。加上課堂上或者網上學到既方法都未必真係可以用得著，所以唔知可唔可以應付得到。

問：假設在你教導的班別中有一名ADHD學生，你會怎樣做？

答：我記得學校有教過應該要安排佢地坐係比較偏僻既地方，盡量少干擾。

問：你認為SED3001能夠有助你更認識ADHD嗎？為什麼？

答：雖然我唔係好記得學咗咩。但都有既，我相信對準教師黎講都好有用，可以知多多少少有關ADHD既基本知識。不過個Course好似都好少提到ADHD，成個課程講太多唔同既SEN學生啦，都幾混亂下。

問：完成 SED3001 後，你對 ADHD 的看法有改變嗎？請解釋你的答案。

答：無乜特別，因為我覺得要親身去感受過先知，淨係知課本上既野都無乜用，唔會即刻改變到咩睇法。

Participant T (had NOT completed SED3001 yet)

問：你曾否在大學中參與任何有關介紹ADHD的活動或課程？如有，該活動/課程的內容是什麼？

答：無。

問：你認為自己對ADHD的認識程度有多少？（1=最低，7=最高）

答：2分，除咗知道名同聽過其他人講少少之外都無接觸過。

問：你對ADHD的看法是？（1=最差，7=最好）請解釋你的評分。

答：4分，因為只要佢地有適當既支援都可以同正常人無分別，所以無特別覺得係好負面既事。

問：你有信心教導ADHD學生嗎？（1=十分沒有信心，7=十分有信心）

答：3分，因為我自己無乜耐性。我諗ADHD學生應該比較需要老師多花時間去留意或關注，所以我覺得自己應該未必能夠好有信心咁面對佢地或者去教佢地。

問：假設在你教導的班別中有一名ADHD學生，你會怎樣做？

答：多少少關心個名學生既進度，例如比額外筆記佢地或者安排課後補課等，盡量令到佢可以跟上其他同學既進度。