Development of a nursing education program for improving Chinese undergraduates' self-directed learning: A mixed-method study

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SUMMARY

Objective: This paper demonstrates the establishment of an extra-curricular education program in Chinese context and evaluates its effectiveness on undergraduate nursing students' self-directed learning.

Methods: Zimmerman's self-directed learning model was used as the theoretical framework for the development of an education program. Mixed-method was applied in this research study. 165 undergraduate students from a nursing college were divided into experimental group (n = 32) and control group (n = 133). Pre- and post-tests were implemented to evaluate the effectiveness of this education program using the self-directed learning scale of nursing undergraduates. Qualitative interview was undertaken within participants from the experimental group to obtain their insights into the influence of this program.

Results: Both quantitative and qualitative analyses showed that the program contributed to nursing students' self-directed learning ability. In the experimental group, the post-test score showed an increase compared with pretest score (p < 0.05). The score of experimental group was higher than control group (p < 0.05) after 18 months training, while there was no difference between them before this program. Qualitative results from 9 students' experience were formulated as three main thematic categories: influence on awareness, influence on learning activities and influence on learning environment. It can be found in the qualitative analysis that learners benefited from this program.

Conclusion: The education program contributes to the improvement of nursing undergraduates' self-directed learning. Various pedagogic methods could be applied for self-directed learning.

Introduction

Given the development in health care and education, there has been a growing emphasis on lifelong learning. Self-directed learning (SDL) which is applicable for lifelong learning has been advocated as an appropriate pedagogical method in nursing education (Simon and Aschenbrener, 2005; Kocaman et al., 2009). Students' SDL ability can be improved in undergraduate education to prepare them for staying up-to-date with contemporary nursing development (Muir Gray, 2001). The origin of SDL can be traced back to John Dewey who defined education as the agency for the individual's growth and suggested that the educator should be the one who guides, but does not control the process of learning (Dewey, 1918, 1938). Based on this understanding, Knowles (1975) defined SDL as a process in which learners take the initiative, with or without the help of others, in diagnosing their learning needs, formulating objectives, identifying available resources for learning, choosing and implementing appropriate strategies, and evaluating achievement which is widely accepted.

In this study, researchers developed an education program that consists of a series of extra-curricular activities with an overall aim of promoting students' self-directed learning. The efficacy of this education program in improving SDL was evaluated accordingly.

Background

Undergraduate nursing education includes both professional knowledge and learning skills. Professional knowledge prepares them to be qualified health professionals, while learning skills enable them to be prominent learners. SDL is believed to be useful in improving students' confidence and self-management in their lifelong learning (O'Shea, 2003). For nursing students, SDL increases their independent learning competence and enhance their sense of responsibility in study (Slevin and Lavery, 1991). In China, undergraduate nursing students do not perform well in SDL (Zhang and Wang, 2011). So educators place emphasis on the facilitation of SDL in nursing education nowadays.

Educators from worldwide have tried many teaching methods to promote students' self-directed learning in undergraduate education;
there are some advantages from them. Team-based learning is suggested to improve learning behavior of nursing students in SDL by fostering interactions and encouraging class engagement, especially for weaker students (Cheng et al., 2014). Al-Kloub reports that problem-based learning develops undergraduates’ independent learning in a clinical pediatric nursing course (Al-Kloub et al., 2014). The innovative teaching strategies which are characterized as interactive, team focused, structured, objective, and experiential are also proved to be beneficial to self-directed learning (Liou et al., 2013). Though Internet-based teaching method is quite popular for its flexibility and convenience, it has no direct impact on self-directed learning in a nursing research introduction course (Gagnon et al., 2013). Students enrolled in Internet-based course require for more faculty feedback and interaction (Seckman, 2014). In conclusion, SDL is usually studied in one course, but its influence on extra-curricular nursing education is rarely reported. This study represented an innovative extra-curricular education program which is incorporated with key components of SDL.

Lots of experience can be drawn from previous studies for the facilitation of SDL. According to Mohammad, effects of SDL increase when learners were involved in identifying learning resources (Murad et al., 2010). So Knowles (Knowles, 1975) advised learners to consult with teachers and choose the right strategy that fits them best when taking SDL. Lucia suggested that teamwork and appropriate strategies can increase an individual’s motivation to become self-directed (Cadarin et al., 2013). However, several implications need to be considered in SDL facilitation. SDL method should be applied in certain settings, for example, for advanced learners, for the students with limited teachers and academic resources, or implemented as a supplemental learning method when studying content is large (Murad and Varkey, 2008). As teaching skills would influence the efficiency and effectiveness of SDL (Chen et al., 2012), teachers and learners should possess competencies and skills required to implement SDL (Levet-Jones, 2005).

There is a growing zeitgeist for explaining students’ self-directed learning in recent years. A number of theoretical views are used to explain the phenomena of SDL. Zimmerman’s SDL model is taken as the framework for this education program. This model is based on the social cognitive view (Zimmerman, 1989). According to Bandura’s social cognitive theory, SDL would be influenced by personal, environmental, and behavioral determinants. There is a triadic reciprocity among these three influences, which can be affected by individual’s efforts to self-regulate, changes in environmental context, and outcomes of behavioral performance (Bandura, 1977, 1986). Among these three determinants, self-efficacy is considered to be the key influence in the personal dimension; self-observation, self-judgment and self-reaction are proposed to be the major influence in the behavioral dimension; physical context and social experience are depicted as the environment-related influence (Zimmerman, 1989). In this study, the relationship of three determinants was fully considered in the activity design to keep balance of the triadic reciprocity. Students were encourage to follow learning phases when they carry out SDL activities, which includes planning phase, behavior phase, and self-reflection phase. (Zimmerman, 2000; Pang, 2002).

**Methods**

**Study Design**

This study was mixed-method designed. Students volunteered to participate in the education program. This program was applied in a series of extra-curricular activities continued for 3 semesters (48 weeks from October, 2012 to April, 2014), which aimed at enhancing the undergraduate nursing students’ self-directed learning ability. Learners’ SDL ability was assessed two weeks before commencement of the study, and reassessed immediately after the completion of the study; their feelings about the program were also investigated in the end of the study.

**Participants**

In total, 165 undergraduate nursing students from a medical university in China were recruited. All the participants were full-time students in grade 1, grade 2 and grade 3. The fourth year undergraduate nursing students were excluded, because they are absent from the university-based education for their full-time clinical placement.

Among those participants, 32 nursing students submitted applications for participating in the education program, which was the experimental group. The remaining 133 students were classified as the control group.

**Intervention**

**Experimental Group**

Three types of activities were designed by researchers in this education program, which included learning by imitation, learning by communication and learning by exploration. The first two components were parallel for earlier training, and the third one was operated for further development.

Initially, students from the same year level were grouped together and facilitated by a senior academic nursing staff. Each group had 6 to 7 students and there were five groups in total. All of the facilitators had more than 5-year experience in nursing education and clinical practice.

Considering the students’ different learning background which is the personal influence in SDL, three learning objectives were integrated into each type of activities for students from different grades. They were “Promote interests of nursing” for grade 1, “Deepen comprehension of nursing” for grade 2 and “Practice in clinical nursing” for grade 3. For grade 1 students, conditioned by their past pedagogical learning experience, the preceptors would take more teacher-centered module to get them to be familiar with nursing occupation and arouse their interests in nursing. For grade 2 students, it was important to help learners acquire more knowledge in depth which is relevant to their professional learning in classroom. For grade 3 students, they were encouraged to apply knowledge in clinical practice. When the students enrolled to the higher grade, preceptors adjusted teaching strategy and learning activities according to the changed objectives. Students from grade 3 took the same objective when they moved to graded 4, and they quitted this program as soon as they finished exploration study on nursing topic.

In the module of imitation, the preceptors invited students to participate in their research programs, which conformed to each objective. For example, one of the research programs for grade 1 was “development of nursing occupation in Shanghai Province”, “influence of Chinese traditional culture on postnatal care” for one group of grade 2 and “Psychological nursing for patients with chronic pain” for grade 3. Students took one semester to practice research activities under preceptors’ direction. During this period, seminars and workshops were organized alternately per month to help learners get familiar with SDL; some of the themes were “how to manage your time”, “methods for information searching” etc. The students got awareness of identifying learning interests and strategies.

In the module of communication, an Academic Salon was held once a month by each group for sharing study feelings and adjusting learning strategies with their preceptors. All the groups gave representation on their own study topics twice a month. Students learned from each other by representing knowledge and exchanging ideas. This component was designed to give learners a wider perspective and strengthen their interpersonal skills by establishing an interactive academic environment.

In the module of exploration, students integrated interests into learning behaviors. Each SDL group was divided into two learning groups. Then, each learning group chose nursing topics that interested them and made a proposal to explore these areas. Preceptors guide learners to choose topics in accordance with their grade-
related objective settings. For example, one topic chosen by freshmen was “The qualities possessed by qualified nurse”. Sophomores preferred literature review to deepen and broaden knowledge learned in class. One of the topics of junior students’ was literature review to deepen and broaden knowledge learned in class. Several types of funding were offered by school to support their study. Students were in charge of their learning behaviors, including choosing topic, identifying strategies and making budget. During this period, students draw conclusion and reflection on their research by journaling. The study notes were submitted to preceptor twice a period, students draw conclusion and re-

The SDL education program is summarized in Fig. 1.

Control Group
The participants took the same curriculum as the experimental group, except the extra-curricular SDL training which is exclusive for experimental group.

Procedure
The self-directed learning scale of nursing undergraduates (SLSNU) developed by Yi Lin (Lin and Jlang, 2003) was used to measure the SDL ability of nursing undergraduates. It consists of 28 items, which could be further grouped into three factors of “self-management”, “information searching” and “corporation learning”. Each item was measured on a 5 point Likert scale with 5 indicating “totally agree” and 1 being “totally disagree”. The sum score of the scale is calculated as an overall indicator of SDL ability. This scale has been validated in Chinese population with good reliability and validity. The Cronbach’s alpha (α) is 0.863, while for each factor the Cronbach’s alpha (α) ranges between 0.696 and 0.789. The content validity was confirmed by the experts specialized in nursing and education. Both of the experimental and control groups accepted pre- and post-test with SLSNU.

In addition, individual interviews were undertaken to explore experimental students’ insights of the influences of this program on study after training. Data collection ceased when no new themes emerged. In total, 9 individual interviews were conducted. Interviewees were 3 from grade 1 (3/13), 3 (3/12) from grade 2 and 2 (2/17) from grade 3.

Fig. 1. Shows the SDL education program. There are three modules in this program. Framework of education program.

All the interviews were facilitated by one researcher to control potential bias in data collection. Semi-structured interview guide was designed before. All the conversations were audio-recorded, with each lasting for 30 min to 90 min.

Ethical Consideration
This study conformed to the principles of Declaration of Helsinki (Williams, 2008). All participants read and signed the informed consent before joining in this study. The students were informed with the study purpose, methods of data collection, assurance of anonymity, confidentiality and the right to withdraw from the study at any time. As the SDL education program was an extra-curricular activity, the students’ performance in this study would not affect their Grade Point Average.

Data Analysis
The quantitative data were entered into SPSS Statistics (Version 16.0; SPSS, Chicago, IL, USA) for analysis. Descriptive statistics showed the demographic characteristics of the sample. As all the quantitative data fit the normal distribution and the homoscedasticity, paired t-test was used to analyze SLSNU score of the experimental group before and after the program, while independent sample t-test was used to see the difference between the experimental group and control group.

Qualitative analysis continued throughout the interviews. Two researchers analyzed verbatim transcribed interviews with Colaizzi’s phenomenological method (Nacy and Susan, 1998) to get an in-depth understanding of students’ experience for this program. In the beginning, researchers read transcripts more than once to gain a sense of the whole. Then open coding was used to cluster recurrent text. After comparative analysis of all the narratives, researchers achieved final consensus of major themes and sub themes. Finally, themes extracted were returned to interviewees for confirmation to ensure the rigor of findings.

Results

Quantitative Results
A total of 165 undergraduate nursing students completed the SLSNU (validating answering rate is 100%). In the experimental group, 31 were females and 1 was male, 13 were from grade 1, 12 were from grade 2 and 7 were from grade 3; the students’ ages varied from 18–24, with an average age of 20.9. In the control group, 111 were females and 22 were males, 42 were from grade 1, 44 were from grade 2 and 47 were from grade 3; the students’ ages varied from 18–23, with an average age of 20.53.

The pretest and post-test scores of experimental group were shown in Table 1. The score of post-test showed an increase compared with the pretest score (p < 0.05).

In Table 2, the scores of control group and experimental group were analyzed as a further evidence to confirm the effect of this program. In the pretest, no difference was found between the two groups (p > 0.05). But in the post-test, the score of experimental group showed an increase compared with the control group (p < 0.05).

Table 1
The pretest and posttest scores of experimental group.

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean ± SD</th>
<th>95% confidence interval</th>
<th>t</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest score</td>
<td>88.38 ± 8.22</td>
<td>-8.78</td>
<td>-0.77</td>
<td>2.433</td>
</tr>
<tr>
<td>Posttest score</td>
<td>93.16 ± 12.54</td>
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Increased Confidence for Study. Many students showed increased confidence in study, because their attempt and study activities were well supported by the program. In addition, students were not only comfortable with the present study, but also had faith in their future development.

“As I am a freshman, I didn’t know how to study……after this practice I am getting to know how to learn effectively.”

[Nursing student, P]

“Actually, nursing is not my first choice for my university study … But after taking this program, my feeling with nursing changed a lot. Nursing is not only the dull words in the book, but also a practical and helpful occupation for the people, I would like to take more efforts to learn it.”

[Nursing student, D]

“Then we took insight into nursing area, there are many problems needed to be solved … I can’t wait to deal with these problems using my knowledge and competence.”

[Nursing student, X]

Identifying Learning Interests Within Nursing Subject. Students described that they developed a definite interest on their own gradually. This program enabled students to broaden their horizons, find their interests and dive into the nursing field.

“Working with the instructor helped me to know the cutting-edge knowledge, my improved understanding of nursing helped me identify my interests … my research area is an extension of my instructor’s research program.”

[Nursing student, W1]

“Thanks to the enlightenment from this education program … now I am used to thinking about the underlying problems of phenomena … home care of the colostomy patients is my interesting topic, I want to learn it in-depth.”

[Nursing student, G]

Table 2
The total score of experimental group and control group after the education program.

<table>
<thead>
<tr>
<th></th>
<th>Mean ± SD</th>
<th>95% confidence interval</th>
<th>t</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>SDL group</td>
<td>93.16 ± 12.54</td>
<td>0.16</td>
<td>9.36</td>
<td>2.043</td>
</tr>
<tr>
<td>Control group</td>
<td>88.40 ± 11.66</td>
<td></td>
<td>6.32</td>
<td>0.043</td>
</tr>
</tbody>
</table>

Qualitative Results

Important aspects of students’ experience about this program were formulated as three main thematic categories: influence on awareness, influence on learning activities and influence on learning environment. Subcategories and illustrative quotations were presented to demonstrate the major themes.

Influence on Personal Awareness

Taking Positive Attitudes Toward Nursing Study. Students described the improved motivation for nursing study. In this program, students undertook various learning activities except classroom study; this flexible form attracted students to consider what is nursing and what the nurse’s responsibility is.

“Our group made a lecturing about diabetes nursing. Before this lecture we had no idea about lecturing and limited knowledge about diabetes … we internally motivated to search for relative information, do investigation … I learned some useful methods, such as how to use the database, how to do the survey.”

[Nursing student, D]

“Then we started our own research, we were highly encouraged by the funding and assistance supplied by this education program … you know, we couldn’t get so much help before.”

[Nursing student, W2]

Influence on Learning Behavior

Experiencing Self-Management During this Program. Nursing students described the increased initiative and autonomy for study. They became responsible for their own development, trying to organize self-learning activities to achieve the goal.

“Traditionally we were used to be told ‘remember this’, ‘write down that’ in the classroom. But this time, I need to choose my study topic, make plan by myself and solve the problems independently…I took responsibility for my school work.”

[Nursing student, P]

“Record and Reflection is quite important for learning. I recorded all my research process and summarized experience, thoughts and earnings in study note. Drawing lesson form the note contributes improving my further study.”

[Nursing student, W2]

Learning Knowledge and Skill Through Practice. Most nursing students mentioned the acquisition of knowledge and skill from this extra-curricular activity. They become more resourceful and inventive with improved learning capacity.

“Our group made a lecturing about diabetes nursing. Before this lecture we had no idea about lecturing and limited knowledge about diabetes … we internally motivated to search for relative information, do investigation … I learned some useful methods, such as how to use the database, how to do the survey.”

[Nursing student, D]

“The instructor of our team is patient and informative, we followed her direction step by step and finished the project … we can hardly get so much knowledge in the class.”

[Nursing student, X]

 Applying Theoretic Nursing to Practice. Application of knowledge in practice enables students to test their future roles as a qualified nurse. Several students tried to treat the nursing problem with advanced theories. When they got the positive response, they saw the value of their role.

“When I was on placement in the oncology department, I found many patients suffer from depression … I learned the Traditional Chinese Medicine five element music in a seminar, this kind of music could appease depressed patients. So I recommended different five element music to the patients according to their disease … they felt more comfortable with these music.”

[Nursing student, W2]
Influence on Learning Environment

Respectable Role Model Provides a Positive Atmosphere. Many students treasured the opportunity to work with the preceptors. The communication with senior nurses who were prominent in nursing area encouraged students to clarify their career plans.

“When I heard the career story of head nurse Qing in the workshop, I was moved … you can feel her favor of this job, she is proud to be a nurse … just like she said ‘we can get a lot of joy from the patients’ smile’, I want to be a happy girl like her.”

[Nursing student, C]

“MS Wu had been nurse for 50 years, she is successful in her career … she always encourages us to be an excellent nurse … if I make efforts in my career, I am sure I will fulfill her wishes.”

[Nursing student, D]

Mechanism of SDL Program

As changing individual’s educational beliefs and practices is difficult and time-consuming (Hand, 1993), it is hard to take a long-term intervention only in the classroom. This program provides a stable environment to encourage students’ participation in learning activities for the development of SDL ability. Three determinants including personal influence, behavioral influence and environmental influence are considered in each module of the program.

It is assumed that several factors would influence the autonomous study of learners, which includes familiarity with content, degree of technical skills, confidence of personal competence and the context of learning situation (Candy, 1991; Knowles, 1975, 1980). Researchers tried to prepare learners with skills and confidence for SDL by creating collaborative faculty–student relationships in the beginning of this program. Then, learner-centered study was highly advocated in the following procedure.

As the personal influence, students’ learning backgrounds were considered attentively in program design. They were involved in learning needs assessment and goal setting to get a high achievement motivation for SDL. In addition, learners were equipped with declarative knowledge, procedural knowledge and strategic knowledge, with which, their self-efficacy was improved.

Barrows asserts that the improvement of SDL ability must be perfected through active, repeated and guided practice associated with learning process (Barrows, 1983). So as the behavioral influence, teachers provided practice opportunities and students were involved in choosing study topic, searching for resources and making strategies for their own study. In forms of communication and keeping records, learners evaluate their prior performance, adjust behavior control and make a plan for following study.

Mischel asserts that human learning remains strongly dependent on social environmental context from which it sprang (Mischel and Peake, 1982; Zimmerman, 1983). In this program, modeling or persuasion from tutors, assistance from other students and funding provided by school were considered as social support for learners. Interactive academic environment created in the forms of Academic Salon and seminar facilitated the communication between teachers and students.

Limitations

The fourth-year students are excluded in this research because of their absence in the campus, which means the result may be not suitable for the senior students.

Conclusion

In this research, it is identified that the SDL program which is designed as a supplemental education program to the classroom instruction contributes to the improvement of learners’ SDL both in quantitative and qualitative evaluation. Zimmerman’s SDL model is taken as the framework for this program. A variety of pedagogic methods could be applied for self-directed learning, while three determinants should be taken into consideration.

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