Effects of an Online Public Health Service Training among Grass-Root Health Care Workers: A Pilot Study in Rural China

Xingxin Zhan, Zhixia Zhang, Rong Hu, and Weirong Yan*

Department of Epidemiology and Biostatistics, School of Public Health, Tongji Medical College, Huazhong University of Science & Technology, Hangkong Road 13, Wuhan, China

Abstract. Objective: To assess the effectiveness of online training platform in grass-root health care workers. Methods: A pre-test/post-test study was conducted among 200 grass-root health workers from primary health institutions in ZhiJiang county, HuBei Province in China. We evaluated the training effects by comparing the trainees’ test scores before and after training and the results of a self-administrated questionnaire survey among the trainees. Results: The average post-test score improved significantly in the two courses. The results of questionnaire survey among the trainees showed the majority of respondents agreed that the online training platform meet their training needs and easy to use. Conclusion: The pilot study suggested that the online training platform was an effective approach to enhance the knowledge of public health services among grass-root health care workers.

Keywords: Training Platform, Pilot Study, Grass-Root Health Workers, Public Health Services, Moodle.

1. Introduction

China has launched the Basic Public Health program since 2009, which aims to ensure an equal access to basic public health service [1]. Primary health care institutions, which are the most fundamental units in the three-tier medical care system, act as the major forces in the implementation of the Basic Public Health program [2], [3]. It has been revealed that the overall working capacity of the public health workforce in primary health care institutions in China is relatively weak because of the lack of training [4], [5]. At present, the traditional training for primary health care workers tends to use face-to-face interaction at a setting time and space, the benefits of which are usually influenced by the uneven access to the training[6]. With the development of information technology, web-based training has become an increasingly popular approach for delivering well-designed, learner-centered, interactive learning resources in recent years [7]. The platform for online training of basic public health services was established in 2013, based on Moodle system (Modular Object-oriented Dynamic Learning Environment). The platform is expected to provide well-organized training modules about basic public health services among primary health care workers. In order to assess the effectiveness of the training, we conduct a pilot study among 200 grass-root health care workers in Zhijiang county, HuBei province, China.

2. Materials and Methods

2.1. Ethics committee approval

The pilot study has been ethically approved by the Institutional Review Board of Tongji Medical College, Huazhong University of Science and Technology.

2.2. Study design and sample

A pre-test/post-test study was conducted in 200 grass-root health care workers from primary health institutions such as township health centers and village clinics in ZhiJiang. One-two village doctors from each village clinic and four-five health care workers from each township health center were recruited to the study.

* Corresponding author. Tel.: +86(27)83650713; fax: +86(27)83650713.
E-mail address: weirongy@gmail.com.
2.3. The platform for online training of basic public health services

The platform for online training of basic public health services based on Moodle (http://elearning.tjmu.edu.cn/gwfw/) aims to improve the knowledge of public health service among primary health care workers. The platform has several user-friendly functions, such as bulletin board system, discussion forums, calendar and so on. The attendance register in the platform is to record the time the trainee start to learn and the duration of his/her learning process. It will help us to supervise the study pace of the trainees and ensure the course modules finished within a specified time.

2.4. Training materials

Two course modules offered in the pilot study including course module 1-Health Management of Clients with Type 2 Diabetes, course module 2-Health Management of Hypertensive Clients. Each course module was comprised of pre-test, learning materials, post-test and discussion forum. Learning materials are mainly in the form of PowerPoint presentations and the learning process can be self-paced individually. Each course was divided into three to four sections. At each section, five to six test questions (singe-choice question) were inserted among the slides. Each slide was attached with a synchronous audio.

2.5. Evaluation methods

The training effects were evaluated by comparing the trainees’ test scores before and after training as well as the results of a self-administrated questionnaire survey among the trainees. The maximum possible score of the pre- and post- test in each course module were 100. The self-administrated questionnaire consisted of two parts. The first part provided demographic information (age, sex, educational level and working time), and the second part enabled trainees to assess various elements of the training platform, including degree of satisfaction with the format and contents of the learning materials, views on the modules, ease of use, overall satisfaction with the online training experience using a five-point Likert scale.

2.6. Statistical analysis

Student’s paired \( t \) test was used to compare pre- and post-test scores. The significant level was set at \( p < 0.05 \). Three indicators were calculated to evaluate the learning gain. (1) Absolute learning gain = %post-test score - %pre-test score. (2) Relative learning gain= ( %post-test score - %pre-test score)/ %pre-test score. (3) Class-average normalized gain (\( g \)) = (%post-test score - %pre-test score)/ (100%-%pre-test score)] [8]. A class-average normalized gain (\( g \)) of 30% was considered significant according to Hake’s criteria for the effectiveness of the educational intervention [8], [9].

3. Results

3.1. Demographic Characteristics

200 grass-root health workers (123 men, 77 women) registered as platform users. Of the registered users, over half (\( n=150 \), 75%) had a high school diploma and 164 trainees (82%) were from village clinics. Most participants (\( n=113 \), 56.5%) were more than 40 years old, while 73 trainees (36.5%) aged over 50 years old. Most trainees (\( n=146 \), 73%) had over 3 years working experiences of delivering the basic public health services. A total of 180 trainees (115 men and 65 women, 90%) responded to the questionnaire.

3.2. Learning gain

The pre- and post-test scores were compared to evaluate learning gain of each course. Only those trainees who had completed both the pre- and post-test were included in the analysis. As shown in Table 1, of the registered trainees, 172 trainees (86%) completed the pre- and post-test at course module 1; 178 trainees (89%) finished the pre- and post-test at course module 2. The average post-test scores improved significantly in these two course modules. For the two courses, the absolute learning gain was 21.63%, 26.68% respectively; the relative learning gain was 48.87%, 55.26% respectively; and the class-average normalized gain was 0.6988(69.88%), 0.7931(79.31%) respectively.
Table 1: Pre-Test, Post-Test Scores and Learning Gain

<table>
<thead>
<tr>
<th>Score/gain</th>
<th>Course 1 (N of trainees =172)</th>
<th>Course 2 (N of trainees=178)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test score (%pre-test)</td>
<td>70.17±23.83</td>
<td>66.18±21.15</td>
</tr>
<tr>
<td>Post-test score (%post-test)</td>
<td>91.80±11.30*</td>
<td>92.95±10.10*</td>
</tr>
<tr>
<td>Absolute learning gain</td>
<td>21.63</td>
<td>26.68</td>
</tr>
<tr>
<td>Relative learning gain</td>
<td>48.87</td>
<td>55.26</td>
</tr>
<tr>
<td>Class-average normalized gain</td>
<td>69.88</td>
<td>79.31</td>
</tr>
</tbody>
</table>

Values of pre-test and post-test score are represented as mean ± SD (%). Maximum score for each course: 100.
Absolute learning gain, relative gain and class-average normalized gain expressed as percentage.

*p<0.001 using Student’s paired t test (pre-test score vs post-test score)

3.3. Trainees’ feedback
As shown in Table 2, most respondents commented positively (strongly agree/agree) on the design of pre-test (89%), Flash lectures (90.2%), audio explanations in the flash (90.8%) and inserted exercises (91.9%). Most of users (97.7%) thought the training materials were appropriate. As for the “attendance register”, 82.5% of the respondents believed that it was helpful to promote self-directed learning. Most users (91.3%) were satisfied with the interaction with tutors and peers in the platform. According to 83.5% of the respondents, the platform was easy to navigate and use and 63.5% of them agreed that the platform response speed was fast, while 4.4% of them reflected the speed was slow. When asked about the overall satisfaction with the online training in the platform, 91.4% of the users expressed positive views.

Table 2: Trainees Feedback about the Platform Using a Five-Point Likert Scale

<table>
<thead>
<tr>
<th>Statement</th>
<th>strongly agree</th>
<th>agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>strongly disagree</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The design of pre-test was good.</td>
<td>85(47.2)</td>
<td>69(38.3)</td>
<td>17(9.4)</td>
<td>2(1.1)</td>
<td>0(0)</td>
<td>7(3.9)</td>
</tr>
<tr>
<td>2. The lectures made in the form of flash were good.</td>
<td>88(48.9)</td>
<td>59(32.8)</td>
<td>15(8.3)</td>
<td>1(0.6)</td>
<td>0(0)</td>
<td>17(9.4)</td>
</tr>
<tr>
<td>3. The audio explanations in the lecture were good.</td>
<td>83(46.1)</td>
<td>55(30.6)</td>
<td>14(7.8)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>28(15.6)</td>
</tr>
<tr>
<td>4. The inserted exercises in the flash were good.</td>
<td>93(51.7)</td>
<td>65(36.1)</td>
<td>14(7.8)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>8(4.4)</td>
</tr>
<tr>
<td>5. The training materials on it were relevant and appropriate.</td>
<td>133(73.9)</td>
<td>40(22.2)</td>
<td>4(2.2)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>3(1.7)</td>
</tr>
<tr>
<td>6. “Attendance Register” was helpful to promote my training.</td>
<td>53(29.4)</td>
<td>88(48.9)</td>
<td>29(16.1)</td>
<td>1(0.6)</td>
<td>0(0)</td>
<td>9(5)</td>
</tr>
<tr>
<td>7. I was satisfied with the interactions with tutors and peers.</td>
<td>85(47.2)</td>
<td>72(40)</td>
<td>15(8.3)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>8(4.4)</td>
</tr>
<tr>
<td>8. It was easy to navigate and use.</td>
<td>44(24.4)</td>
<td>103(57.2)</td>
<td>26(14.4)</td>
<td>2(1.1)</td>
<td>1(0.6)</td>
<td>4(2.2)</td>
</tr>
<tr>
<td>9. The platform responses speed was good.</td>
<td>42(23.3)</td>
<td>71(39.4)</td>
<td>57(31.7)</td>
<td>8(4.4)</td>
<td>0(0)</td>
<td>2(1.1)</td>
</tr>
<tr>
<td>10. The overall online training experience was great.</td>
<td>69(38.3)</td>
<td>90(50)</td>
<td>15(8.3)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>6(3.3)</td>
</tr>
</tbody>
</table>

Statements were scored using a five-point Likert Scale, where 5=strongly agree, 4=agree, 3=neutral, 2=disagree, 1=strongly disagree, N/A, not available.

4. Discussion

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In this pilot study, we found that the average post-test score improved significantly in these two courses. The class-average normalized gain (g) has been used as a measure of effectiveness of an educational intervention in previous studies [8]-[10]. It is graded as follows: 0.1-0.29 low gain, 0.3-0.69 medium gain and 0.7-1.0 high gain [8]. In our study, the class-average normalized gain was 0.6988(69.88%), 0.7931(79.31%) for course module 1 and course module 2 respectively. It indicated that the training was effective according to the defined criteria by Hake [8]. The training platform may be effective to enhance health care workers’ knowledge of public health services. However, the internal validity of pre-/post-test results may be influenced by some variables such as knowledge background, knowledge gain maintenance and Hawthorne effect [8], [10].

The results of questionnaire survey among the trainees showed the majority of respondents agreed that the online training platform meet their training needs and easy to use. However, we noticed that 4.4% of the respondents reflected the platform response speed was slow, which was mainly influenced by the poor internet connection in primary health institutions. This may pose a great challenge to the promotion of the web-based training in more primary health institutions. Trainees claimed that the slow speed would hinder their learning motivation. Besides, the study was conducted in the same group with single web-based learning. A more reliable appraisal of web-based learning efficacy should be based on the comparison with the traditional face-to-face training and blended training in various populations.

5. Conclusions

The pilot study in ZhiJiang suggested that the training platform have a potential to enhance the trainees’ knowledge of delivering public health services. With the growing popularity of internet usage in China, the application of Internet-based training among grass-root health care workers is a promising training approach.

6. Acknowledgements

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7. References