

Original Research

# Using Sensory Approach to Teach Medicinal Plants: a Before and After Study

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## Article info

### Article History:

Received: 5 Aug 2014  
Accepted: 20 Oct 2014  
ePublished: 18 Dec 2014

### Keywords:

Teaching methods,  
Medicinal plants,  
Sensory perceptions

## Abstract

**Introduction:** The most commonly-used method of teaching medicinal plants courses among the faculty of Traditional Medicine is a lecture-based slideshow, but we hypothesize that herb knowledge could be reinforced by using a sensory approach in which students have the opportunity to interact with these plants using their five senses. The aim of this study was to obtain students' knowledge about the morphological characteristics of current medicinal plants. The students learned about the plants using all senses before, immediately after, and 40 days after intervention. We also assessed the satisfaction rate of students as a result of this educational intervention.

**Methods:** As a pre-test, 27 students who had attended medicinal herb classes answered a questionnaire with open-ended questions about the morphological characteristics of herbs. Immediately after the educational intervention, for their post-test, students filled a questionnaire comprised of the same questions on the pre-test. The mean scores of students in pre-test (A) and post-test (B) were calculated. Forty days after the aforementioned session, students answered a different questionnaire covering the previously discussed morphological characteristics of herbs. The mean scores of participants in this exam were C. A and B, A and C as well as B and C were compared and analyzed by SPSS v.17 ( $p \leq 0.001$ ). This workshop was evaluated by a questionnaire.

**Results:** There was a significant difference between A and B, B and C as well as A and C ( $P$ -value=0.001). The rate of student satisfaction on five items of the questionnaire was higher than 90%.

**Conclusion:** Exclusive textbook-based learning of medicinal plants might not be sufficient to understand them, and it seems useful for the faculties to integrate physical sensory experiences into herbal educational methods.

## Introduction

In recent years there has been concern in increasing student interest and modifying teaching and learning activities.<sup>1</sup> Achieving various purposes, like learning improvement tasks or higher student understanding, requires new practices and experiences in classrooms.<sup>2</sup>

According to Traditional Iranian Medicine (TIM) manuscripts, large numbers of medicinal plants have been shown to have great potential for the treatment of different diseases. These traditions of yesterday have led to the natural therapy approach.<sup>3-5</sup> Therefore, herb sciences, which include the identification and scientific classification of medicinal plants and their active constituents (as well

as preparation and application principals) have developed in recent years.<sup>6-7</sup> The dominant method of teaching medicinal plants in botany classrooms in many institutions is a lecture-based slideshow; in other words, students listen and see examples with no direct practice or application of sensory perceptions. Although a lecture-based slideshow can be helpful to learning, prior studies have shown that learning is reinforced by using all the senses: vision, hearing, smell, taste and touch.<sup>8-9</sup> Since misinformation about identifying and distinguishing medicinal plants could lead to mistakes, and subject patients to harmful effects, the aim of this study was to examine students'

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knowledge about the morphological characteristics of current medicinal plants. We included students who had attended a botany class, then checked their knowledge before, after and 40 days after the workshop or educational intervention. We also researched student satisfaction of the physical-sensory approach to learning medicinal plants.

### Materials and Methods

Samples of currently-used medicinal plants were purchased from the market and each plant was placed in a transparent container for visibility. In this study, we evaluated 27 students who had attended a medicinal herbs class that used a lecture-based slideshow at Tabriz University of Medical Sciences from October to December 2013. Before the educational intervention, as a pre-test, students answered a questionnaire with open ended questions so that we could evaluate their knowledge about the morphological characteristics of herbs taught in the slideshow and lecture in the medicinal plants class. In that session, the workshop about the morphological characteristics of the same medicinal plants was held. This educational intervention included looking at each herb and making observations about color, shape, taste and aroma. As a post-test, immediately after workshop, students completed a questionnaire comprised of the same questions as the pre-test. The mean scores of pre-test (A) and post-test (B) were calculated. Then, forty days after the educational intervention, students answered a different questionnaire covering the morphological characteristics of herbs previously discussed. The mean scores of participants in this exam (C) were calculated. The scores of A and B (pair 1), A and C (pair 2), as well as B and C (pair 3) were compared. The collected data were analyzed by SPSS v. 17. Descriptive statistics such as mean value and standard deviation were calculated. In order to compare the variables among tests, a T-test was used. The level of significance was set at ( $p \leq 0.001$ ) in all tests. The workshop was also evaluated by a questionnaire.

### Results

After students completed the educational intervention and subsequent questionnaire, the sum of students scores before (A), after (B) and 40 days after (C) the workshop were compared. There was a significant difference between A and B (pair 1), B and C (pair 2) and A and C (pair 3) shown in the results (Table 1). After our comparison of paired sample tests, pairs 1, 2 and 3 showed significant differences between the score sums ( $P$ -value= 0.001) (Figure 1).

As mentioned previously, the effectiveness of the workshop was also evaluated by a questionnaire filled out by students. Table 2 presents the results of the workshop evaluation, which shows the rate of student satisfaction by answering questionnaire with items set on a scale from 0-100%.

### Discussion

In recent years, the increased popularity and use of complementary and alternative medicine has caused

growth in the number of universities offering related courses.<sup>10-11</sup> Among the various courses taught, herbs and botanicals with pharmacological qualities are important topics covered.<sup>12-13</sup> Therefore, it is important to effectively learn the fundamental topics of medicinal plants, especially to distinguish them from similar herbs that could be poisonous. Learning could be defined as an active process of investigation and creation based on the learners' interest and curiosity and should result in expanded conception, insights, knowledge and skills.<sup>14</sup> Utilizing physical or external senses as educational aids can improve teaching efficiency as well as the learning process.<sup>15-16</sup> In other words, students' experiences with all five senses develop memory of the senses, which can help students reach educational and training goals.<sup>17-19</sup> Since multisensory learning makes for memorable experiences, we chose this method for the teaching of medicinal plants. As seen in Table 1 and Figure 1, the score sum of 27 pharmacy students who were taught medicinal plants using lecture-based slideshow before the educational intervention was  $6.55 \pm 3.01$  (A). This exam was given to assess students' knowledge and skills about identifying and distinguishing medicinal plants before the workshop. This finding was unexpectedly low, and suggested that the lecture-based slideshow method might not be thoroughly successful in facilitating the learning of medicinal plants. The significant difference between A and B scores showed that this educational intervention could be successful in helping students learn medicinal plants; subsequently, the most interesting finding was the significant difference between A and C, which demonstrated that students benefitted tremendously from using their sensory perceptions in learning and remembering medicinal plants. The results of the workshop evaluation questionnaire are shown in Table 2. As seen in this table, the strengths of this workshop (which received over a 90% positive response) were the following: first, respectful and incentive behavior of the operators (96.42%); second, good and sufficient presenter knowledge of the subject (96.15%); third, respectful and incentive behavior of the presenter (95.19%); fourth, participants' gains based on the aims of workshop (92.85%); and fifth, a workshop atmosphere in which participants could freely tell their opinions (90.47%). Moreover, additional recommendations of participants included at the end of questionnaire were as follows:

1. This method of teaching helped me a lot to learn and identify herbs.
2. Please prepare all types of medicinal plants, to learn them by this method.
3. Repeat these kind of workshops, we will attend again.
4. Herbs stick to my mind and now I can immediately identify the taught ones.
5. This method satisfied my intrinsic interest to learn medicinal plants in self directed way.
6. Before this workshop, I only knew the names of herbs, but now I can recognize them easily.
7. Time of workshop was very limited; please hold

up workshops like this more. The significant difference between A and B, as well as A and C, might be explained by the additional recommendations of participants. Using this method of teaching, students could easily identify and remember the morphology of herbs, and their intrinsic interest to learn medicinal plants in self-directed way was satisfied and they also became interested in learning other types of medicinal plants, which demonstrated their self-efficacy and increased intrinsic motivation for this topic.

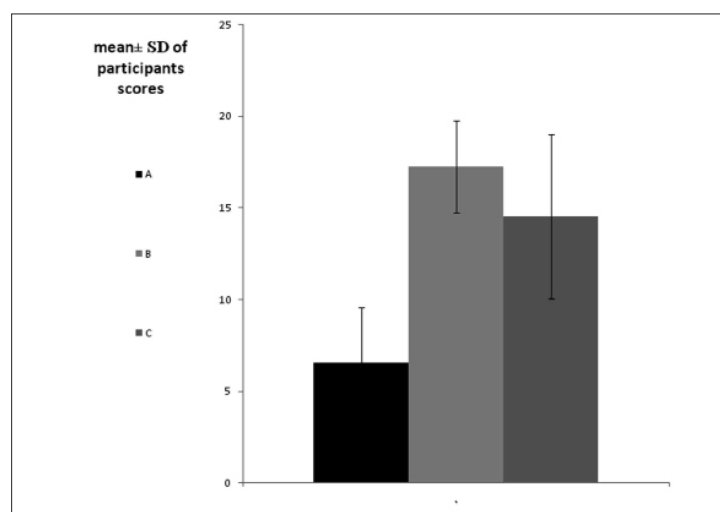
### Conclusion

Even though many ideas and opinions formed by students

are learned through books and the Internet, some concepts cannot be completely understood without using sensory perception. Exclusive textbook-based learning might not be sufficient for building student knowledge, so it seems useful to integrate physical sensory experiences into our herbal educational methods. Furthermore, it is good to train a new generation of students to use the sensory-integrated learning method, which encourages student interest in self-directed learning. Further statistic studies are needed to compare the two methods of learning medicinal plants (lecture-based slideshow and sensory-based learning).

**Table 1.** Mean of participant scores in different stages

Mean of participants scores	A	B	C
Sums of scores (mean±SD)	6.55±3.01	17.25±2.47	14.56±4.47



**Figure 1.** Diagram of mean±SD of participants' scores in different stages. Sum of students' scores before (A), after (B) and 40 days after (C) workshop

**Table 2.** Results of workshop evaluation, which shows rate of student satisfaction using questionnaire items set on a scale from 0-100%.

No.	Questionnaire items	Percent (%)
1	Before attending to workshop enough information about time, place and topic of workshop had given to me.	54.8%
2	Before starting, there was an explanation about the aims of workshop.	87.5%
3	Before starting, there was an explanation about the method of presentation.	89.42%
4	Aims of workshop were in close relationship with my profession.	80.76%
5	Audio visual aids had good quality.	85%
6	Some helpful methods were used to persuade me to energetic participation in this workshop.	85.57%
7	Workshop presenter's knowledge of subject was good and sufficient.	96.15%
8	Presenter's behavior was respectful and incentive.	95.19%
9	Operators' behavior was respectful and incentive.	96.42%
10	Atmosphere of workshop was propitious.	88.09%
11	Atmosphere of workshop was suitable for participants to freely tell their opinions.	90.47%
12	Presenters helped participants reach aims of workshop.	92.85%
13	Workshop was managed orderly and with correct doctrine.	85%
14	There was enough time to response to doubts and queries.	79.76%
15	There was enough time for workshop activities conducted during the workshop.	79.76%
16	Presenter helped participants increase their knowledge about research matter.	84.52%
17	Participants gained usable skills and will be able to apply them in their academic or personal life.	78.57%
18	Presenter helped participants gain main aims of workshop.	85.71%

### Competing interests

No competing financial interests exist.

### Acknowledgments

We would like to express our thanks for the financial and general support of Dr. Torbati, head of the Traditional Medicine faculty of Tabriz.

### References

1. Black P, Wiliam D. Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice* 1998;5(1):7-74.
2. Guskey TR. Professional development and teacher change. *Teachers and Teaching: theory and practice* 2002;8(3):381-391.
3. Balunas MJ, Kinghorn AD. Drug discovery from medicinal plants. *Life Sci* 2005;78(5):431-441.
4. Rates SM. Plants as source of drugs. *Toxicon* 2001;39(5):603-613.
5. Hemaiswarya S, Kruthiventi AK, Doble M. Synergism between natural products and antibiotics against infectious diseases. *Phytomedicine* 2008;15(8):639-652.
6. Calixto JB. Twenty-five years of research on medicinal plants in Latin America: a personal view. *J Ethnopharmacol* 2005;100(1-2):131-134.
7. Gurib-Fakim A. Medicinal plants: traditions of yesterday and drugs of tomorrow. *Mol Aspects Med* 2006;27(1):1-93.
8. Bandura A. Social learning theory of aggression. *Journal of Communication* 1978;28(3):12-29.
9. Auer MR. Sensory perception, rationalism and outdoor environmental education. *International Research in Geographical and Environmental Education* 2008;17(1):6-12.
10. Brokaw JJ, Tunnicliff G, Raess BU, Saxon DW. The teaching of complementary and alternative medicine in U.S. medical schools: a survey of course directors. *Acad Med* 2002;77(9):876-881.
11. Wetzel MS, Kaptchuk TJ, Haramati A, Eisenberg DM. Complementary and alternative medical therapies: implications for medical education. *Ann Intern Med* 2003;138(3):191-196.
12. Firenzuoli F, Gori L. Herbal medicine today: clinical and research issues. *Evid Based Complement Alternat Med* 2007;4(Suppl 1):37-40.
13. Linde K, ter Riet G, Hondras M, Vickers A, Saller R, Melchart D. Systematic reviews of complementary therapies - an annotated bibliography. Part 2: herbal medicine. *BMC Complement Altern Med* 2001;1:5.
14. Kolmos A. Reflections on project work and problem-based learning. *European Journal of Engineering Education* 1996;21(2):141-148.
15. Kátai Z, Juhász K, Adorjáni AK. On the role of senses in education. *Comput Educ* 2008;51(4):1707-1717.
16. Stark ME, Grafman J, Fertig E. A restricted 'spotlight' of attention in visual object recognition. *Neuropsychologia* 1997;35(9):1233-1249.
17. Bowker R. Children's perceptions of plants following their visit to the Eden Project. *Research in Science & Technological Education* 2004; 22(2):227-243.
18. Phillips WA. On the distinction between sensory storage and short-term visual memory. *Percept Psychophys* 1974;16(2):283-290.
19. Wood JN. Visual memory for agents and their actions. *Cognition* 2008;108(2):522-532.