

A Study of the In-service Hot Spot and Attendance Model of Professional Development

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Abstract: - The purpose of this study was to present a way to identify the in-service hot spot and create an attendance model based upon the profile information and distance away from the hot spot. Empirical data was gathered for verifying purpose. It was argued that distance for joining professional development could be a factor affecting the attendance. The research data were collected from 9824 senior high school teachers who attended in-service advancement education activities from January to November in 2008. The teachers' profile information was collected from "Nationwide Teacher In-service Education Information Web" (<http://inservice.edu.tw/>) database. And then Google Earth was drawn upon to get the latitude and longitude of each teacher's working site and the Discipline Centers' sites in which teachers attended in-service advancement education activities to obtain the straight distance. Besides, the TWD67 system—the Route Guide System devised by Institute of Transportation, Ministry of Transportation and Communications, Taiwan, R.O.C. was applied to obtain the distance by road. The descriptive statistics, t-tests, and one-way ANOVA were used to analyze the data. The results of the study indicated that "hot spots" of in-service advancement education activities which were held by Discipline Centers and which senior high school teachers attended were mainly located in Taipei City and Kaohsiung City. A total of ten background variables of teachers were examined to compare mean group differences (gender, age, educational background, marital status, additionally administrative duty, first registered specialty, total of in-service teachers' registered specialties, school type, school size, and school location). There were differences in the straight distance and distance by road among teachers' age, educational background, marital status, first registered specialty, total of in-service teachers' registered specialties, school type, school size, and school location.

Key-Words: - In-service Hot Spot, Professional Development, Attendance, High School Curriculum Guideline, Discipline Centers, In-service advancement education, straight distance, distance by road

1 Introduction

People join in-service education to gain professional growing. There is a need to explore where do they go for the learning activity and whether there is a hot spot for professional learning.

The revision of high school curriculum resulted from the innovation of Grades 1-9 Unifying Curriculum and the dissatisfaction with the high school curriculum at that time in society. The High School Temporary Curriculum Guidelines of 2006 focus on six revised principles, which are "continuity," "generality," "adaption," "flexibility," "profession," and "democracy." All of these hope to pay more attention to senior high school students' individual differences, to make them more enthusiastic, reasonable, and fully cultivated in humanities (High School Temporary Curriculum Guidelines, 2005). In 2008, For the continuation of High School Temporary Curriculum Guidelines, the Ministry of Education adjusted courses slightly and

promulgated "High School Curriculum Guidelines," according to which Discipline Centers were established to assist in the promotion of new courses, to collect the implementation experience after curriculum innovation, to promote the teachers' professional development of subjects, and to carry out senior high school teachers' in-service advancement education.

When the high school curriculum innovation was in progress, teachers' professional development would be the most important factor in the new curriculum implementation. It also decides whether the reform succeeds or not. The new curriculum empowers teachers and gives them more and more responsibility in curriculum decision-making, including planning, practice, and evaluation. For these reasons, how to improve their professional ability is very important [1,2,3,4,5].

Teachers' in-service advancement education is the best way to improve their ability [1]. Through

in-service advancement education, the teacher could make self-examination, learn new instructional skills, gain confidence from others' respect and confirmation, absorb others' experience and new knowledge, etc. Teachers' in-service advancement education is also a life-long learning system. Only when teachers are willing to pursue further education constantly could they promote their career status and sustain their teaching quality even better[2,3,4,5].

Lin [6] indicated that there are many factors to hinder teachers from attending in-service advancement education activities for professional development as follows:

- 1) Lack of institutionalization of in-service advancement education system.
- 2) The quality of in-service advancement education activities differs.
- 3) There are individual negative effects of environmental factors, e.g. distance, etc.
- 4) The teacher's teaching career development planning is ignored.
- 5) Teaching and additionally administrative duty are too heavy for teachers to attend in-service advancement education activities.

Among them, teachers' individual and environmental factors have a great influence on their attending in-service advancement education activities, e.g. inappropriate course time, the pressure of taking care of family, the activity site is far et al. In other words, convenience is the key factor in facilitating teachers to take part in in-service advancement education activities.

In recent years, there are many researches about in-service advancement education but there has not been any research thesis that focuses on the distance factor. In addition, in related studies, the subjects are the mostly elementary and junior high school teachers. There are few researches which investigate senior high school teachers.

With the implementation of reformation of education policy in Taiwan, in order to integrate the resources of teachers' in-service advancement education and to encourage teachers to participate in the in-service advancement education activities positively, the Ministry of Education established 12 regional teacher's in-service advancement education centers in 2003, and National Kaohsiung Normal University is the chief institution to set up "Nationwide Teacher In-service Education Information Web" (<http://inservice.edu.tw/>). This network provides teachers in Taiwan a communication platform about in-service advancement education. Through this network, we were able to draw up the data of in-service advancement education activities held by Discipline

Centers, teachers' background variable data, and data of attendance frequency at the Discipline Center. Besides, by Google Earth, we got the information of the straight distance from teachers' school locations to the sites of in-service advancement education activities and by National Road Information Center Navigation System (<http://e-traffic.iot.gov.tw/>) constructed by Institute of Transportation, Ministry of Transportation and Communications, Taiwan, R.O.C., we obtained the data about the distance by road from teachers' school locations to the sites of in-service advancement education activities.

According to all of the above, this research aimed to investigate the differences between the distance from teachers' working sites to the sites of in-service advancement education activities which Discipline Centers held and senior high school teachers' attendance frequency of in-service advancement education activities.

2 Problem Formulation

In this study, there are four research goals listed as follows:

- 1) To understand "hot spots" of in-service advancement education activities held by Discipline Centers in adherence to High School Curriculum Guidelines of 2008.
- 2) To understand "hot spots" of in-service advancement education activities which teachers attended in adherence to High School Curriculum Guidelines of 2008.
- 3) To determine if significant differences existed between demographic variables and the straight distances.
- 4) To determine if significant differences existed between demographic variables and the distances by road.

Each key term used in this study is elaborated on as follows:

1) Discipline Centers

Discipline Centers are a means of assistance promulgated in High School Curriculum Guidelines. Their main functions are to promote new curriculums, hold in-service advancement education activities, and collect opinions after the implementation of the curriculums. There are 23 Discipline Centers in Taiwan which are established within senior high schools. 22 Discipline Centers were included in this study; the Discipline Center for National Defense General Education was excluded.

2) In-Service Advancement Education

In-service advancement education means that

one attends advancement education activities (e.g., attending courses, auditing classes, doing research) besides working hours on the job to brush up professional knowledge and skills[7]. In this study, in-service advancement education means that senior high school teachers attended activities which Discipline Centers held from January to November in 2008.

3)Hot Spots

Hot spots include “frequency,” “geography,” and “time”[8]. In this research, there are two phases of “hot spots”: one is the “hot spot” of in-service advancement education activities conducted by Discipline Centers, and the other is the “hot spot” of in-service advancement education activities which teachers attend.

4)Straight Distance

In this research, by Google Earth, we got WGS84 coordinates of each teacher’s working site and the sites of in-service advancement education activities which Discipline Centers held. We could calculate the straight distance between the teachers’ working sites and the sites of in-service advancement education activities which Discipline Centers held by the following formula:

$$\text{Dis} = ((\text{longitudeX1} - \text{longitudeX2})^2 + (\text{latitudeY1} - \text{latitudeY2})^2)^{0.5} * 111$$

5) Distance by Road

By using the following formulas to convert the WGS84 system of Google Earth to the TWD67 system developed by Institute of Transportation, Ministry of Transportation and Communications, Taiwan, R.O.C., we got the latitude and longitude of each teacher’s working site and Discipline Centers’ sites where teachers attended in-service advancement education activities:

$$t67x_E = \text{CInt}(((\text{longitude} - 121) * 101745.445) + 250000)$$

$$t67y_N = \text{CInt}(((\text{latitude} - 24) * 110754.8256) + 2655032.3)$$

And then by using the road network system also devised by Institute of Transportation, Ministry of Transportation and Communications, Taiwan, R.O.C. (<http://e-traffic.iot.gov.tw/>), we were able to calculate the distance by road.

2.1 Review of related research

This part provided a review of the literature relevant to in-service advancement education. First, the meaning of teachers’ in-service advancement education was reviewed. Next, we reviewed literature

about teachers’ in-service advancement education with an emphasis on theoretical conceptualization.

2.1.1 Meaning of teachers’ in-service advancement education

Teacher in-service advancement education refers to a teacher, in response to changing times, attending activities, auditing classes, and doing researches in order to enhance the subject knowledge, teaching skills, and professional attitude, thus elevating the professional capacity of teachers and promoting the teaching performance [9, 7]. Teacher in-service advancement education activities are planned systematically and goal-oriented so as to expand teachers’ teaching experience, to induce them to have self-reflection regularly, and to encourage them to assume additionally new roles in order to promote career development [10]. With the changing times, the ways of teacher in-service advancement education are more diversified. In terms of sites, there are in-service advancement education activities home or abroad. In terms of learning time, it can be classified into “full-time study” and “part-time study.” Full-time study can further be classified into “study on unpaid leave” and “study on sabbatical leave.” Part-time study includes participation in summer courses, weekend courses, evening courses, and non-credit courses. The Ministry of Education had promulgated “Methods for K-12 Teacher In-service Advancement Education” (abolished in 2003). According to the Methods, in terms of the learning content, it can be further classified into “in-service advancement education” and “in-service advancement research.” In-service advancement education includes credit courses, degree courses, and non-credit courses. In-service advancement research includes research about teaching, translation, and creation. In addition, for the development of lifelong learning among teachers to enhance the performance, teachers during holidays have to plan courses by themselves, e.g. attending advancement education activities, making preparation for teaching [11](Taipei County Education Bureau’s Official Document, 2003). Advancement education activities refer to teachers handing in plans to attend educational activity projects to administrators and then implementing the projects. Making preparation for teaching refers to teachers using holidays to design curriculums, plan strategy for class management, make teaching

materials, and participate in peer discussion before the next semester.

Orlich [12] categorized teacher in-service advancement education into four paradigms of in-service models as follows:

- Organization-Based Model

This model focus on organizations and individuals are less stressed. Frequently, it uses the need assessment to determine the organization development. This model solves the internal problems of organization mostly.

- Individual-Based Model

The individual can freely decide what learning activities he or she chooses to participate in according to his or her own preferences to meet his or her own demands. This model has the characteristics of self-direction and sustained investment.

- Role-Based Model

This model emphasizes that the individual knows what needs the organization has and then develops the related capacities to contribute them to the organization. Roles are determined by the organization, but modified by the individual. Its focus is on the individual self-determination of the need in the organization.

- Trainer-Based Model

Trainer-Based Model is a subset of Role-Based Model. Trainer-Based Model places more emphasis on specialization and on the achievements and recognition given to participants after learning. This model is often accompanied with evaluation.

Based on the above, different models have different focuses. The first model enhances organizational effectiveness. The second model pays more attention to individual learning needs. The third model emphasizes the role of change in response to organizational needs. The fourth model emphasizes the development of a professionally qualified staff. To enhance the professional development of teachers and in response to curriculum reform and development of the characteristics of school-based curriculums, the organizers of in-service advancement education activities should take into consideration the needs of different schools and teachers.

2.1.2 Teachers' in-service advancement education: Related theories

In-service advancement education for teachers must consider the motivation to participate so as to promote professional growth of teachers and to enhance their teaching effectiveness[13]. The related theories, e.g. behavior theory of motivation, cognitive

theory of motivation, and theory of learning needs are stated as follows:

- Behavior theory of motivation

The behavior theory of motivation is based on stimulus and response. Behavior theory of motivation indicates that motivation in humans comes from learning. The steps of learning follow this model: needs--drive--behavior. "Needs" arise due to physiological imbalance and then the "drive" follows. Finally, the drive leads to acts or behaviors. If the consequences of behaviors are such as to meet the needs and to eliminate the drive, individual behavior and motivation are enhanced at the same time. Afterwards, if the same situation appears, it will trigger the same reaction mechanism to become a custom [14].

- Cognitive theory of motivation

Cognitive theory of motivation indicates that the individual's behavior follows his or her prior ideas and plans. This includes three main themes [14]:

- a. Level of aspiration

This refers to the individual, before doing any actual work, who estimates how much achievement of his or her goals can be achieved.

- b. Cognitive dissonance

It refers to the inconsistency between inner cognition and external behavior.

- c. Expectancy-value

This means the individual's judgment of the value of an expected thing. The individual makes a final decision according to the possibility of achieving these goals.

- Theory of learning needs[15]

The famous learning needs theory is Maslow's need-hierarchy theory. Maslow's need-hierarchy theory is represented as a pyramid with the more basic needs at the bottom. Maslow indicated that the need-hierarchy theory includes five levels from bottom to top: physiological needs, safety needs, belonging needs, esteem needs, and self-actualization needs. The higher needs in this hierarchy only come into focus when the lower needs in the pyramid are met. Once an individual has moved upwards to the next level, the needs in the lower level will no longer be prioritized.

Based on the above, teachers' motivation will influence them to attend in-service advancement education activities. According to behavior theory of motivation, paying more attention to the learning needs of teachers, providing the opportunity to meet the needs, and providing incentives will make teachers more willing to participate.

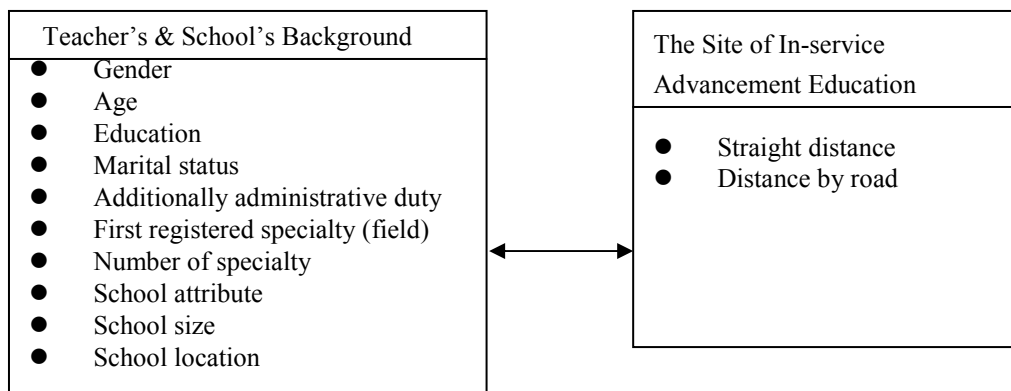


Figure 1 Research variables

According to cognitive theory of motivation, cultivating a positive attitude to participate actively will induce teachers to recognize the importance of in-service advancement education and will make teachers' internal needs in harmony with their external behavior. In addition, providing a phased program, making moderate increase in challenging courses, and raising their level of aspiration will make teachers grow gradually in profession. Finally, according to theory of learning needs, administrators which conduct in-service advancement education have to understand teachers' needs, i.e. basic needs, growth needs and have to provide relevant activities which have less restriction on the distance, the consideration of family burdens, the attention to poor physical limitations.

Table 1 the number, and percentage of variables of Gender and Age

Characteristic	N	%
Gender		
Male	3,330	33.9
Female	6,494	66.1
Age		
Less than 29	1,209	12.3
30 ~ 34	2,285	23.3
35 ~ 39	2,079	21.2
40 ~ 44	1,996	20.3
45 ~ 49	1,256	12.8
50 ~ 54	645	6.6
55 ~ 59	285	2.9
More than 60	69	.6

3 Methodology

In this section, we provide a description of the framework, participants, instruments, and analyses used to address the research questions.

The participants were 9,824 senior high school in-service teachers who attended in-service advancement education activities held by 22 Discipline Centers from January to November in 2008. Demographic characteristics of participants are listed in Table 1.

In Table 2, the educational backgrounds are associate, bachelor, mater, and doctor. The highest number of educational background is master degree with 52.6%. There are 46.6% are married. Only 8.9 % teachers are serving for extra-administration responsibility.

Table 2 the number, and percentage of variables of Educational Background, and Administration

Characteristic	N	%
Educational background		
Associate	32	.3
Bachelor	4,485	45.7
Master	5,166	52.6
Doctor	141	1.4
Marital status		
Single	5,214	53.1
Married	4,578	46.6
Not available	32	0.3
Additionally administrative duty		
Yes	878	8.9
No	8,946	91.1

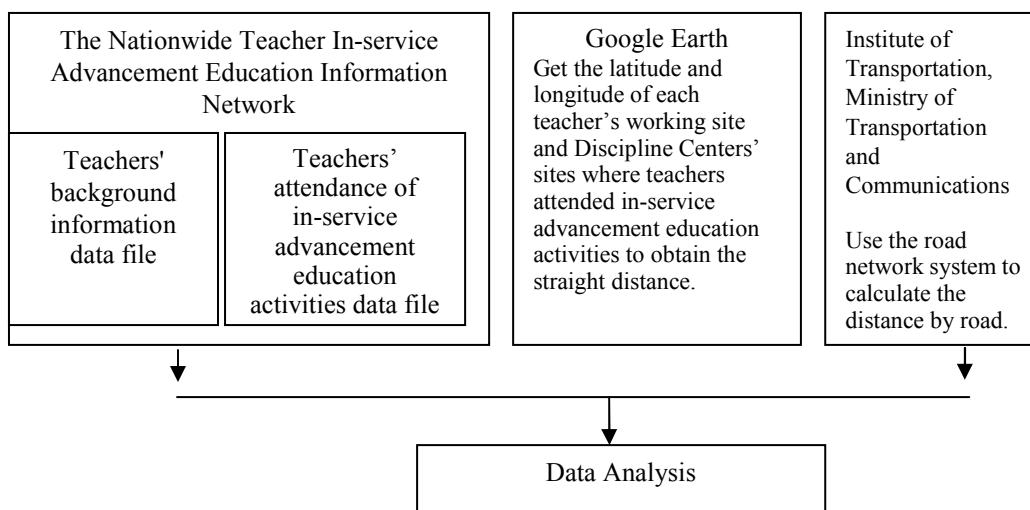


Figure 2 Data collecting procedure

In Table 2, the number of each teaching specialty was listed. The highest number is science and technology teacher.

In the Figure 2, the data collecting procedures were illustrated. The researched database is founded for Nationwide Teacher In-service Advancement Education Information Network [16,17,18] ..

Table 3 the number and percentage of specialty

Characteristic	N	%
First registered specialty		
Science & Technology	2,698	27.5
Society	1,780	18.1
Vocational Courses	788	8.0
Health & Physical Education	536	5.5
Integrative Activities	1,090	11.1
Language Arts	1,159	11.8
Mathematics	587	6.0
Arts & Humanities	979	10.0
Others	64	0.4
Special Education	66	0.7
Not available	77	0.8
Number of specialty		
1	5,107	52.0
2	2,602	26.5
3	1,175	12.0
4	508	5.2
More than 5	350	3.6
Not available	82	0.8

In table 3, the number and percentage of school attributes, sizes, and locations were listed. The attributes of school are national, private, municipal, and prefectural. The highest percentage is national school with 45.6%. The school sizes were categorized based upon the class numbers. Three districts were listed. Those are northern, central, and southern. The northern location is with the highest amount of teachers

Descriptive statistics were used to analyze “hot spots”, “teachers' background variables”, and “the distance from teachers' working sites to Discipline Centers' sites where teachers attended in-service advancement education activities”

Table 4 the number and percentage of school attributes, sizes, and locations

Characteristic	N	%
School attribute		
National	4,478	45.6
Private	2,206	22.5
Municipal	2,074	21.1
Prefectural	1,066	10.8
School size		
less than 40 classes	4,037	43.9
40 ~ 70	4,410	44.8
70 ~ 100	985	10.0
more than 100	131	1.3
School location		
Northern	4,263	43.4
Central	2,665	27.1
Southern	2,896	29.5
Sum total	9,824	100

Table 5 Frequency of “Hot Spots” of In-service Advancement Education Activities Conducted by Discipline Centers

Location	Taipei City	Taipei County	Yilan County	Taoyuan County	Hsinchu City	Nantou County	Taichung City	Taichung County
Course Cumulation	48	16	5	6	7	2	30	3
Location	Changhua County	Yunlin County	Chiayi City	Tainan City	Tainan County	Kaohsiung City	Kaohsiung County	Pingtung County
Course Cumulation	3	2	1	17	3	28	2	3
Location	Taitung County	Hualien County	Penghu County	Kinmen County				Sum total
Course Cumulation	1	4	1	1				183

Besides, to analyze significant differences existing between teachers’ background variables, the straight distance, and the distance by road, t-tests and one-way ANOVA were applied.

The Bayesian Network node was applied to build a probability model by combining observed and recorded evidence with "common-sense" real-world knowledge to establish the likelihood of occurrences by using seemingly unlinked attributes.

relationships between nodes may be represented by a Bayesian network; however, the links in the network do not necessarily represent direct cause and effect. Networks are very robust where information is missing and make the best possible prediction using whatever information is present.

4. Findings

4.1 “Hot Spots” of In-service Advancement Education Activities Held by Discipline Centers.

22 Discipline Centers and 183 courses in 20 areas were included and indicated in Table 5 and Figure 3. The top three highest courses accumulated were the “hot spots” of in-service advancement education activities held by Discipline Centers. The top three were Taipei City (48 courses held), Taichung City (30 courses held), and Kaohsiung City (28 courses held).



Figure 3 Distribution of “Hot Spots” of In-service Advancement Education Activities Conducted by Discipline Centers

A Bayesian network is a graphical model that displays variables in a dataset and the probabilistic, or conditional, independencies between them. Causal

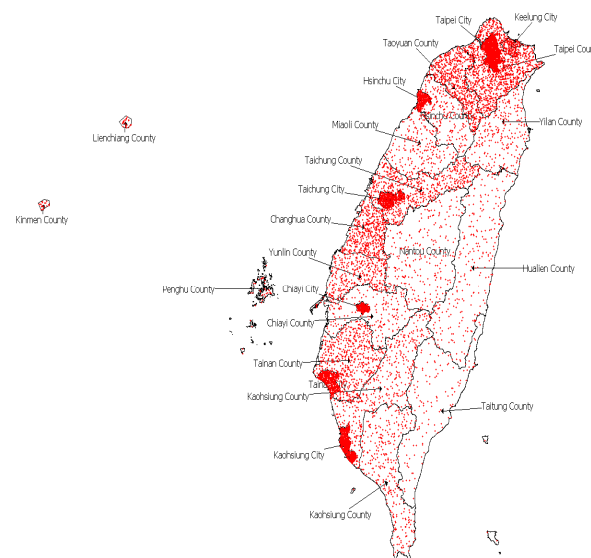


Figure 4 Distribution of “Hot Spots” of In-service Advancement Education Activities Which Teachers Attended

Table 6 Frequency Table of “Hot Spots” of In-service Advancement Education Activities Which Teachers Attended

Location	Taipei City	Taipei County	Yilan County	Taoyuan County	Hsinchu City	Hsinchu County	Keelung City	Miaoli County	Nantou County
Number of attendance	1436	994	242	590	357	180	172	212	237
Location	Taichung City	Taichung County	Changhua County	Yunlin County	Chiayi City	Chiayi County	Tainan City	Tainan County	Kaohsiung City
Number of attendance	509	604	493	364	246	165	526	566	795
Location	Kaohsiung County	Pingtung County	Taitung County	Hualien County	Penghu County	Kinmen County	Lienchiang County		Sum total
Number of attendance	365	313	127	249	39	20	23		9824

4.2 “Hot Spots” of In-service Advancement Education Activities Which Teachers Attend.

The survey data were collected from 9824 senior high school teachers who attended in-service advancement education activities from January to November in 2008. It included 22 Discipline Centers and 183 classes in 25 counties. It was indicated in Table 6 and Figure 4.

The top three highest numbers of attendances accumulated was the “hot spots” of in-service advancement education activities held by Discipline Centers which teachers attended. The top three was Taipei City (Number of attendance =1436), Taipei County (Number of attendance =994), and Kaohsiung City (Number of attendance =795).

Table 7 Numbers of Discipline Centers in Taiwan

Location	Number of discipline centers
Tainan City	3
Ilan County	2
Nantou County	1
Kaohsiung City	4
Hsinchu City	1
Taipei City	5
Taipei County	3
Taichung City	3
Total	22

Table 8 Descriptive Statistics, One-Way ANOVA and Post Hoc Tests of Research Variables about Straight Distance

Characteristic	t/F	Post Hoc Test
Gender	t=1.62	
Age	F=2.59*	Less than 29>40~44.
Educational background	F=4.97**	Bachelor>Master.
Marital status	t= -2.76*	Single>Married.
Additionally administrative duty	t= -.04	
First registered specialty (field)	F=10.21**	Science & Life Technology> Society. Vocational Courses> Society, Health & Physical Education, Integrative Activities, Language, Math, Others. Math> Science & Life Technology, Society, Health & Physical Education, Integrative Activities, Language, Arts & Humanities. Arts & Humanities> Society, Health & Physical Education, Integrative Activities, Language, Others.
Number of specialty	F=5.43**	3>1. 4>1.
School attribute	F=82.31**	National> Private, Municipal, Prefectural Private >Municipal Prefectural > Municipal
School size	F=22.89**	Less than 40 classes>40 ~ 70 classes, 70 ~ 100 classes 40 ~ 70 classes>70 ~ 100 classes
School location	F=92.40**	Central> Northern Southern >Northern

Note. Difference is significant at **p*<.05, ***p*<.01.

According to Table 4, we can find out that the distribution of the 22 Discipline Centers in Taiwan was uneven. Accordingly, the concentration of “hot spots” was related to the locations of Discipline Centers in Taiwan.

4.3 Analysis of the Straight Distance

The straight distance mean for the participants (N=9,824) was 56.59 kilometers. The straight distance from Taipei City to Kaohsiung City is about 299.31 kilometers across 11 cities and counties.

In other words, in terms of the straight distance, when teachers went from the schools where they served to the place where in-service advancement education activities were held, they had to pass through 2.08 to 2.86 counties or cities.

To analyze significant differences existing between teachers’ background variables, the straight distance, and the distance by road, t-tests and one-way ANOVA were used. The Post Hoc Tests Multiple Comparisons were presented in Table 6.

4.4 Analysis of the Distance by Road.

The road distance mean for the participants (N=9,824) was 77.74 kilometers. To analyze significant differences existing between teachers’ background variables and the distance by road from the schools where teachers served to the place where in-service advancement education activities were held, t-tests and one-way ANOVA were used. The Post Hoc Tests Multiple Comparisons were presented in table 9.

5 Conclusions and Suggestions

The straight distance and the distance by road for teachers of less than 29 years old were longer than those for teachers of 40~44 years old when they went to attend in-service advancement education activities. The straight distance and the distance by road for single teachers were longer than those for married teachers. Possibly, it is because young single teachers had vigorous physical strength, did not have fetters of family or did not need to look after young children. The straight distance and the distance by road for teachers with Bachelor’s degree were longer than those for teachers with Master’s degree. Possibly, it is because teachers with Bachelor’s degree didn’t have the pressure to obtain a more advanced degree. And teachers with Bachelor’s degree had to attend more in-service advancement education activities to promote professional development.

The straight distance and the distance by road for teachers among first registered specialty groups were significantly different. Possibly, it is because the

distribution of Discipline Centers which are responsible for different domains was uneven. Different sites of Discipline Centers held different in-service advancement education activities for teachers. For some teachers whose specialty was the same as the subject a Discipline Center was responsible for, the distance was shorter than for other teachers whose specialties were unrelated to the specific Discipline Center.

Table 9 Descriptive Information, One-Way ANOVA and Post Hoc Tests of Research Variables about Distance by Road

Characteristic	t/F	Post Hoc Test
Gender	t=1.06	
Age	F=2.62*	Less than 29>30~34, 35~39, 40~44, 45~49. 50~54>40~44, 45~49.
Educational background	F=4.81**	Bachelor>Master.
Marital status	t= -3.28**	Single>Married.
Additionally administrative duty	F=2.01	
First registered specialty (field)	F=11.30*	Science & Life Technology> Society, Math. Society> Math. Vocational Courses> Society, Health & Physical Education, Integrative Activities, Language, Math, Others. Health & Physical Education> Math. Arts & Humanities> Society, Health & Physical Education, Integrative Activities, Language, Math, Others.
Number of specialty	F=6.51**	3>1. 4>1.
School attribute	F=95.07*	National> Private, Municipal, Prefectural Private >Municipal Prefectural > Private, Municipal
School size	F=35.50*	Less than 40 classes>40 ~ 70 classes, 70 ~ 100 classes, more than 100 classes. 40 ~ 70 classes>70 ~ 100 classes.
School location	F=69.76*	Central> Northern Southern >Northern

Note. Difference is significant at *p<.05, **p<.01.

The straight distance and the distance by road for teachers with many specialties were significantly longer than for teachers with one specialty. Possibly, it is because teachers who had many specialties could have many opportunities to choose activities which they wanted to attend. Because they had many opportunities, it had higher probability for them to go to a distant place for study.

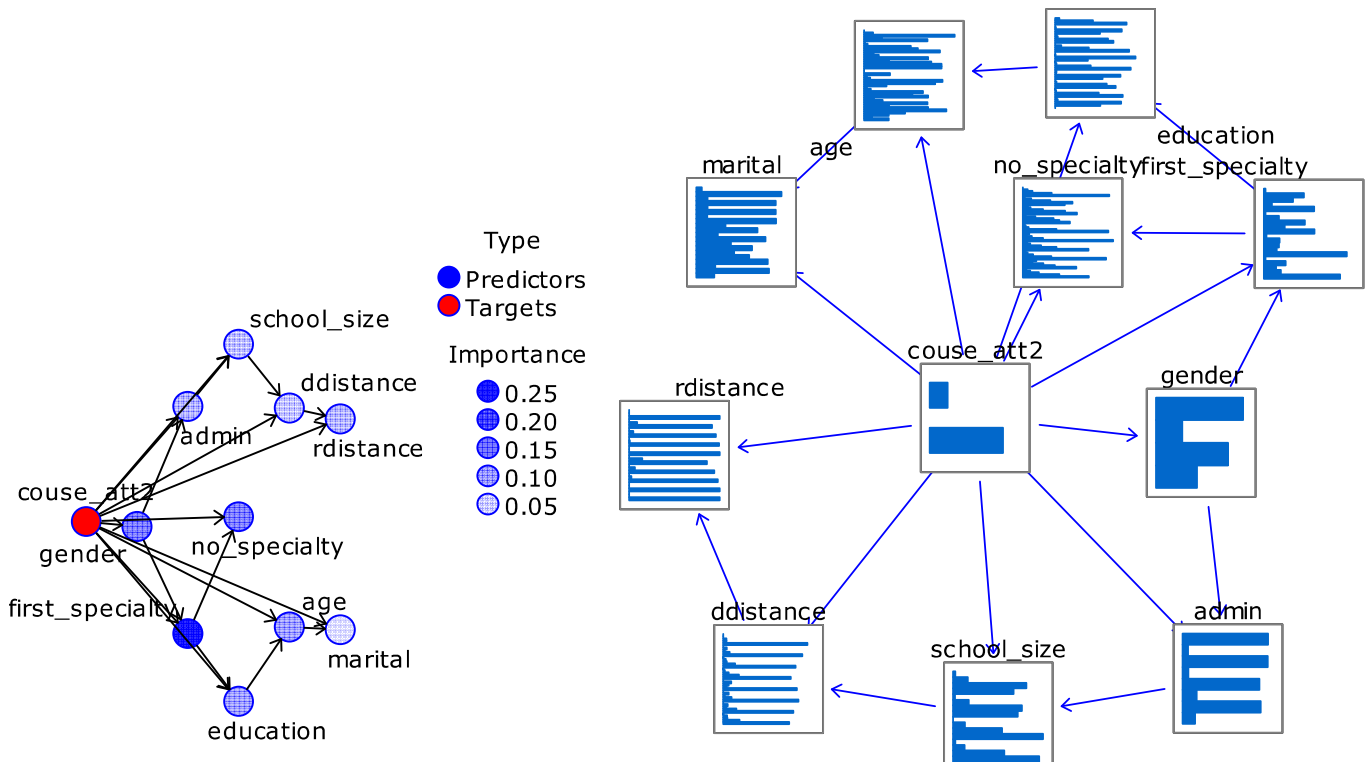


Figure 5 A Bayesian network model of attendance of professional development learning courses

The straight distance and the distance by road among school attributes were significantly different. In terms of the distance from schools where teachers served to sites of activities held by Discipline Centers, teachers from municipal schools traveled shorter than others. Possibly, it is because municipal schools and Discipline Centers concentrated in Taipei City and Kaohsiung City.

by the variable of first registered specialty, gender, numbers of specialty, age, educational background, road distance, school size, direct distance, and status of marriage. The importance level of each variable was listed in figure 6.

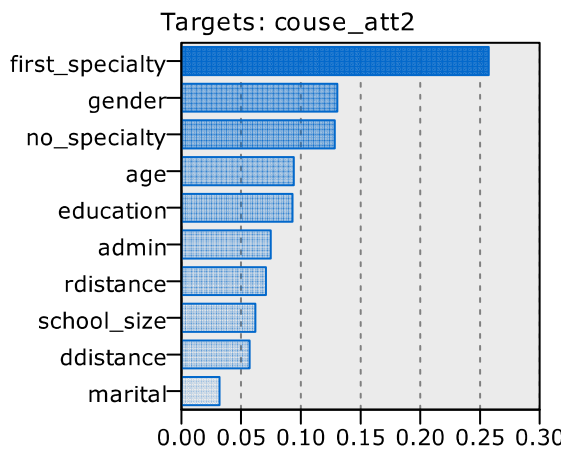


Figure 6 variable importance of attendance model

In the Figure 5, a Bayesian network model was illustrated. The course attendance could be predicted

The straight distance and the distance by road from schools where teachers served to sites of activities held by Discipline Centers, for teachers whose school size was 40~70 classes, were longer than those for teachers from schools of 70~100 classes. Possibly, it is because larger schools concentrated in Taipei City and Kaohsiung City. Those schools were near Discipline Centers and it was convenient for teachers therein to attend in-service education advancement activities.

Finally, the straight distance and distance by road among school locations were significantly different. Possibly, it is because Discipline Centers largely concentrated in northern Taiwan. Comparatively, the distances teachers at central and southern regions traveled to Discipline Centers were longer than those by teachers from the north.

Based upon the results of statistical analysis, we have some suggestions which could be used as important references in making decisions in the future by relevant units of the government and

training organizations. The suggestions are as follows:

Based on the results, we find that “hot spots” have significant relevance to where Discipline Centers are located. Meanwhile, the average of the straight distance and the road distance from teachers’ working areas to the sites of in-service advancement education activities which Discipline Centers hold is too long. The average of the straight distance is 56.59 km, and the average of the road distance is 77.74 km. These are all contrary to the idea that the distance from teachers’ working areas to the sites of in-service advancement education activities should be shorter. These would also reduce the willingness of teachers to attend in-service advancement education activities. In order to shorten the distance from teachers’ school locations to the sites of in-service advancement education activities, the courses which Discipline Centers offer can be increased and spread to other learning activity sites in the future.

The result indicates that the “hot spots” of Discipline Centers holding in-service teacher advancement education activities concentrated in Taipei City, Taichung City, and Kaohsiung City. Besides, the “hot spots” where teachers attended activities offered by Discipline Centers concentrated in Taipei City, Taipei County, and Kaohsiung City. And Discipline Centers mostly concentrated in Taipei City and Kaohsiung City. According to all of the above, the distribution of Discipline Centers is uneven and it is not convenient for teachers to attend activities. In order to shorten the distance from teachers’ school locations to the sites of in-service advancement education activities, Discipline Centers can make good friendship with adjacent senior high schools. And Discipline Centers can provide some training activities for teachers from adjacent senior high schools to become mentorial teachers. Through sharing resource and knowledge, it can reduce the limitation in attending in-service advancement education activities. Furthermore, those mentorial teachers can assist in planning locally in-service advancement education activities to promote other teachers’ abilities.

There are some significant differences in school variables (e.g., school attribute, school size, school location) concerning distance factors. On the basis of the findings stated above, when in-service advancement education activities are held, school variables should be taken into consideration in the future.

Because of the importance of teacher professional development, in-service advancement education is also more and more important. Researches about this field are also growing. But

geographic factors in teachers’ in-service advancement education are less discussed. We hope that this research can spark many further diversified studies.

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