The application of institutional research in a senior high school of Taiwan

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Abstract

Students are the main elements of schools. No students, there will be no teachers and schools, either. Nowadays, school educators are confronted with the challenge of low fertility which causes many school management difficulties in Taiwan. New information techniques and concepts need to be provided to assist the functions of school administration systems. In this paper, we tried to apply an experiment of Institutional Research (IR), aiming to provide evidence-based decision making support to student recruitment policies and school management strategies. With our effort, we tie-in the IR system in a senior high school successfully and offer empirical suggestions to school management. Also, this study contributes to explore the potentials and limitations of IR on guiding school management strategies.

Key Words: Institutional Research, School Management, Student Recruitment

INTRODUCTION

The total fertility rate of Taiwan is between the range of 1.065% - 1.270% since 2012 to 2014 (Ministry of the Interior 2016). Low fertility rate makes school educators confronted with many challenges of school management, especially in students' recruitment. New information techniques and concepts therefore need to be provided to assist the functions of school administration systems.

As we know, the field of IR is over 50 years old and is embedded in nearly every college and university in the United States and many others around the world. IR is used for supporting campus leaders and policy makers in wise planning, programming, and fiscal decisions covering a broad range of institutional responsibilities. Those areas can include research support to senior academic leaders, admissions, financial aid, curriculum, enrollment management, staffing, student life, finance, facilities, athletics, alumni relations and many others (Association for Institutional Research 2014). When we are aware of the developmental difficulties of Taiwan's senior high schools, IR comes to our mind and inspires us to do a pilot study about IR's experiment on a rural senior high school. Precisely speaking, in this paper, we tried to apply an experiment of IR, aiming to provide evidence-based decision making support to student recruitment policies and school management strategies. In our IR empirical research, two research questions are hopefully to be well-understood. First one is that how to establish a senior high school IR model based on Big Data Processing approach. Second one is that how to apply the well-designed IR model to investigate student recruitment policies and practices of a rural senior high school. We designed a multiple factored model of IR in a senior high school and investigated a senior high school's experiment of IR, aiming to provide evidence-based decision making support to student recruitment policies and practices. Our IR model is structured with four analysis modules:

(1) Enrollment Source Analysis;

(2) School satisfaction questionnaire analysis;

(3) Analysis of Learning Status and

(4) Analysis of teachers' instructional quality.

Then the above four analysis modules expand into 25 analysis pages (Lin and Lin 2016). Our well-designed IR model was used to analyze a rural senior school students' enrollment source, academic performance and their

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absence rate. Some productive recruitment and administration strategies and decisions were formed with these analyses. This process is so-called evidence-based decision making support. Based on our research, new creative concepts and techniques are suggested to be brought into educational area, and evidence-based decision makings are encouraged. Broader application of IR in schools will certainly need more investigations in the future.

LITERATURE REVIEW

Literature review includes three parts. In the first part, we mention the development of IR both in America and Taiwan. Then we discuss the concept of IR in the second part. At last, we talk about how to be an effective IR professional.

The Development of Institutional Research
America

IR has been a signicant feature in the management of higher education in the United States for more than half a century. Today, most U.S. universities have dedicated ofces of IR. The establishment of the Association for Institutional Research (AIR) in the 1960s began the process of formalizing the establishment of a cadre of institutional researchers in the United States and the development of an identiable "community of practice" in the United States, with its own culture and expectations, and its own routes for professional recognition, career progression, and ongoing professional development. While stopping short of formal professional regulation, institutional researchers in the United States do represent a clearly identiable group within higher education management. The development of AIR stimulated the emergence of apparently similar regionally based organizations elsewhere, such as the European Association for Institutional Research (EAIR), the South East Asian Association for Institutional Research (SEAAIR), and the Australasian Association for Institutional Research (AAIR). Today, there are many other organizations, including groups in southern Africa, the Philippines, and Puerto Rico (Taylor, Hanlon, and Yorke 2013).

Taiwan

Thirty years ago, Taiwan's universities were so limited that students could hardly pass the entrance exams to acquire their opportunity to higher education. But in today's Taiwan, both less total fertility rate and the huge amounts of universities result in schools' management difficulties. Parents and students have many options to choose their favored schools and the competition between universities becomes more and more intense. Low fertility rate affects not only universities but also elementary schools and secondary education. However in Taiwan now, only universities have the power and competency to do IR. Furthermore, our Association for IR just established in Jan. of 2016. Till now, this research is the first and the only one to study the application of IR in a senior high school in Taiwan. Hopefully, we will start an amazing journey of IR since now.

What is Institutional Research?

The New York Times declared the coming of the age of Big Data in 2012 and then an age of objective, big data analysis, and evidence-based decision also comes. The concept of IR is based on data science, and starts from Big Data theory to revise universities' decision model. The field of IR is over 50 years old and is embedded in nearly every college and university in the United States and many others around the world. Often working behind-the-scenes, IR professionals support campus leaders and policy makers in wise planning, programming, and fiscal decisions covering a broad range of institutional responsibilities. These areas can include research support to senior academic leaders, admissions, financial aid, curriculum, enrollment management, staffing, student life, finance, facilities, athletics, alumni relations and many others. In addition to providing the data-informed foundation for good decision making, institutional researchers use the data they collect for governmental reporting to benchmark their results against similar institutions (Association for Institutional Research 2014). Besides, one founder of the Association for Institutional Research (AIR), Cameron wrote extensively and wisely about IR, and he entitled one of his pieces "IR as Organizational Intelligence" (Fincher 1978).

How to be an Effective IR Professional?

A 1993 Research in Higher Education article (Terenzini 1993) offered a conception of IR as an activity requiring three "tiers of organizational intelligence". There were three forms of personal and professional competence, institutional understanding, and savvy necessary to be an effective IR professional (Terenzini 2013).

Tier 1: Technical/analytical intelligence

The first tier of institutional intelligence-technical and analytical intelligence-has two forms. The first is the body of technical knowledge and information required to be an IR professional on any given campus. The second form of Tier 1 intelligence is analytical and includes familiarity with and skill in using the tools of social science research. This skill set consists of familiarity with the components and canons of good education and social science research, including research design, sampling, measurement, varieties of data gathering/collection, scale (and "indicator") development, and the full array of both quantitative and qualitative analytical methods.

Tier 2: Issues of intelligence

Tier 2, or "Issues of Intelligence", involves most of the substantive problems on which technical and analytical intelligence is brought to bear. Like Tier 1, Tier-2 intelligence has both substantive and procedural or process dimensions. Substantive Tier 2 intelligence includes knowledge of the kinds of issues and decisions that middle- and upper-level administrators in functional units face.

Tier 3: Contextual intelligence

Tier 3, "Contextual Intelligence", may be the Queen Tier, the pinnacle of the pyramid, but it depends on the other two tiers to support it. The contextually intelligent IR professional not only commands the analytical and personal skill sets and understands the topical domains that comprise of Tiers 1 and 2, but also understands how to blend those two intelligence sets in a detailed and nuanced grasp of the context and culture of a particular IR operation-the institution where IR professionals practice their craft (Terenzini 1993).

METHODOLOGY

This study used BI analytical software "Qlikview" to integrate school administration system and designed analysis situations. After literature research (Chung-Hao 2006; Yu-Fang 2015; Chen 2014) and reference to researcher's empirical experience, we raised four modules as below–(1) enrollment source analysis; (2) school satisfaction questionnaire analysis; (3) analysis of learning status and (4) analysis of teachers' instructional quality. Four modules develop 25 analysis pages, as table 1 showed. After situations well-designed, we tried to investigate and form student recruitment policies and practices of a senior high school.

With our effort, we hope to assist school administrators to lead and manage their schools creatively and effectively. Figure 1 shows the procedure of enrollment source analysis. Then the structure of school affairs analysis system is as figure 2 shows.

Figure 1. The procedure of student source data analysis

Table 1: School affairs analysis modules and pages

| Modules	Pages
Enrollment Source Analysis	1. The trend analysis of the enrollment from competitor
	2. Scores Analysis of Admission placement
	3. Analysis of the sources of students- school sources / regions
	4. Analysis of the ways students choose for admission
School satisfaction questionnaire analysis	1. Reputation Impact analysis
	2. Environmental impact analysis
	3. Teacher education and qualifications analysis
	4. Environmental equipment impact analysis
	5. Student Affairs Counseling impact analysis
	6. Course Teaching Effect analysis
	7. Interaction Analysis for social community
Analysis of Learning Status	1. Diagnosis and analysis of grades
	2. Analysis of individual student's starting aptitude
	3. Academic Performance Analysis
	4. Diagnosis of test questions
Analysis of teachers' instructional quality	1. Teaching assessment analysis - overall analysis
	2. Teaching hours load analysis
	3. Curriculum design index analysis
	4. Index for teaching materials compilation analysis
	5. Multiple perspective index analysis
	6. Adaptive learning index analysis
	7. Effective teaching index analysis
	8. Course improvement index analysis
	9. Classroom management index analysis
	10. Remedial teaching index analysis
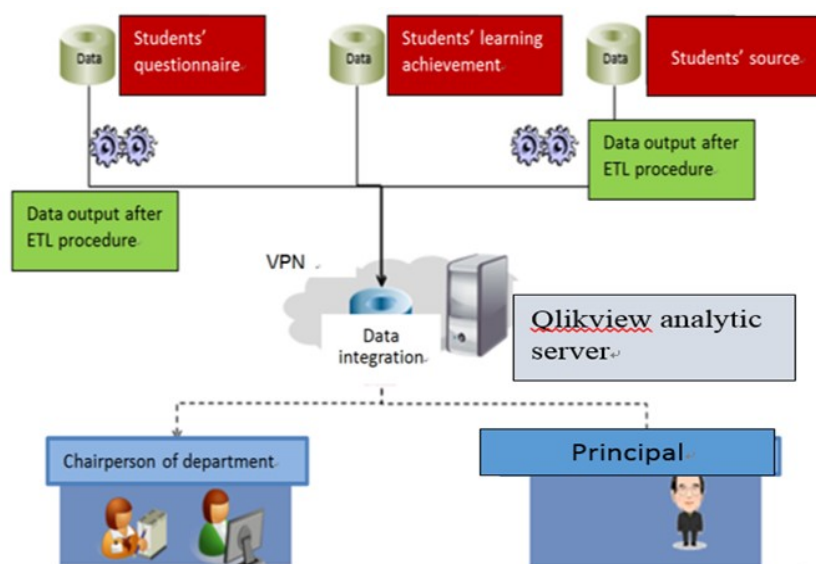
Figure 2. The structure of school affairs analysis system

Our research data are collected from school administration system's database and through questionnaires. After data ETL procedure, well-designed modules are used to analyze those data and produce visual figures and tables. Research procedure and structure are as figure 3 shows.
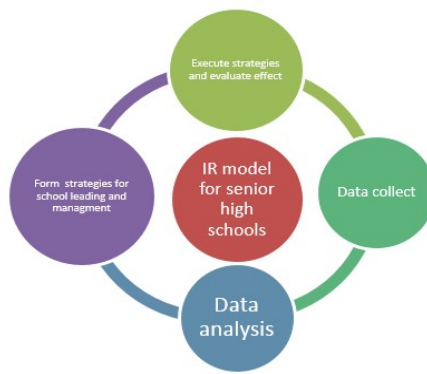
Figure 3. Research procedure and structure

RESULTS AND DISCUSSION

How to establish a senior high school IR model based on Big Data Processing approach?

After literature and reference to our empirical experience, we established a senior high school IR model. This model contains four modules: (1) enrollment source analysis; (2) school satisfaction questionnaire analysis; (3) analysis of learning status and (4) analysis of teachers' instructional quality. Four modules develop 25 analysis pages, as table 1 showed.

How to apply the well-designed IR model to investigate student recruitment policies and practices of a rural senior high school?

We apply our IR model to investigate student recruitment problems and the results are as follows:

The Analysis of the Distribution of Students' Enrollment

As we see in figure 4, the major source of its students exists in the neighborhood; however, the amount of students' enrollment is decreasing. By contrast, the source of its students in the other county is minor but increasing. The analysis of the distribution of students' enrollment can help the senior high school to understand the distribution of its students. With a good understanding of the trend of growth or decrease of students' enrollment in school district, this school can revise its student recruitment policies.
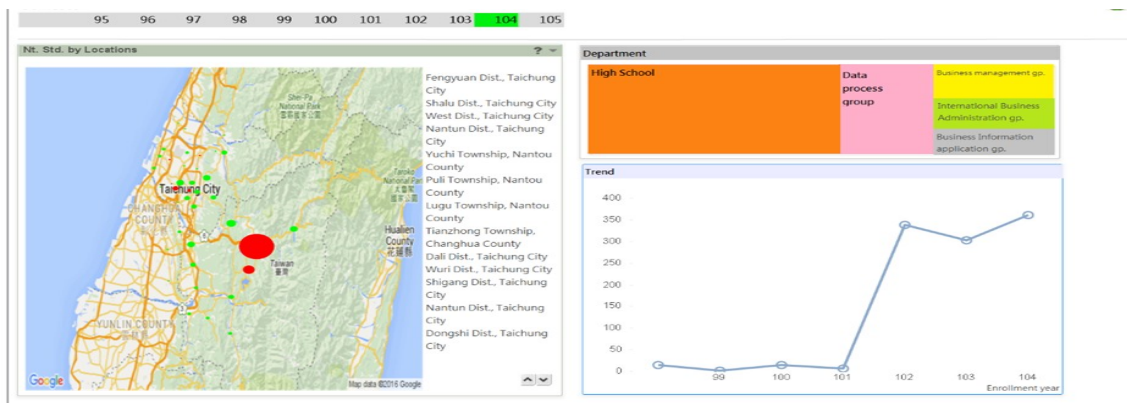
Figure 4. The distribution of students' enrollment

The Trends of Different Junior High School Students' Enrollment

Apart from the analysis of the distribution of students' enrollment, this IR model can also analyze the trends of different junior high school students' enrollment as figure 5 shows. By understanding the growth and decrease trends of different junior high school students' enrollment, this senior high school will get a clear picture of how to reorganize their resources and efforts on students' recruitment.
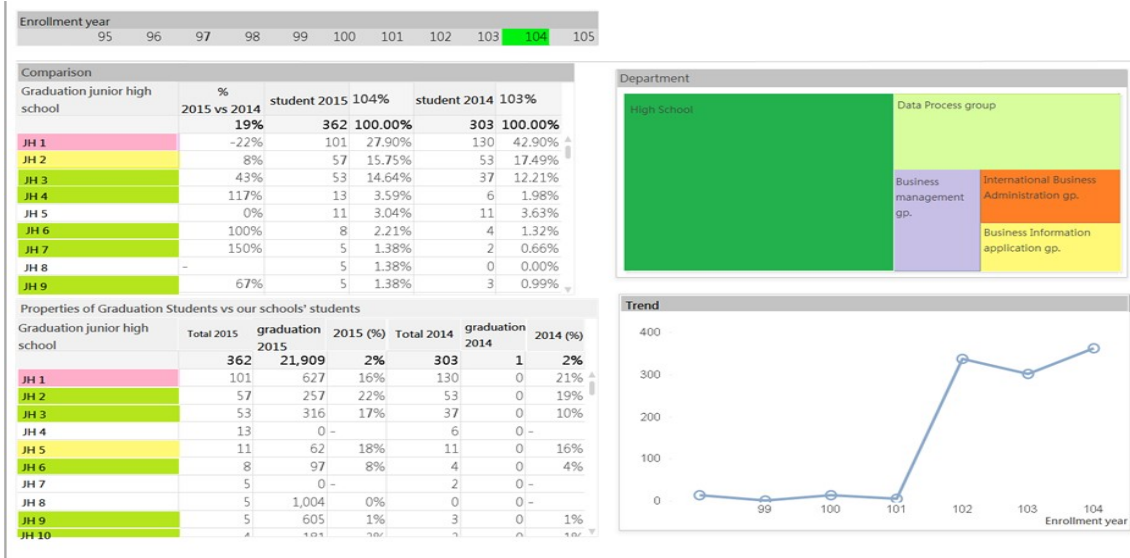
Figure 5. The trends of different junior high school students' enrollment

The Academic Performance Comparison of Students from Different Junior High Schools in All Departments

We also analyze the academic performance comparison of students from different junior high schools in all departments as figure 6 shows. By this analysis, we can help this senior high school to understand the actual and the possible academic performance of different sources of students. Then this school can form their teaching or remedial teaching strategies to improve students' academic performance.
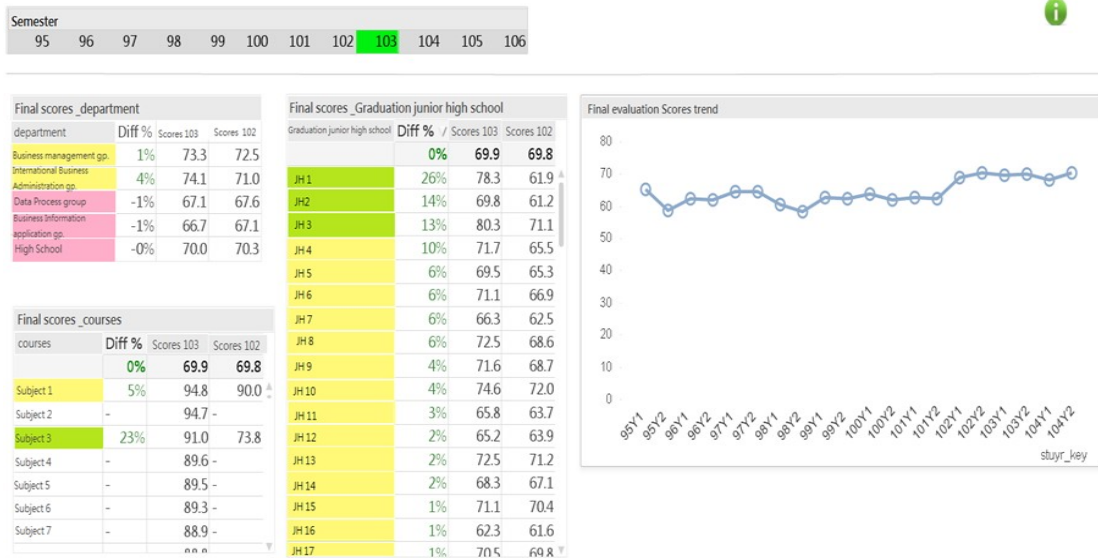
Figure 6. The academic performance comparison of students from different junior high schools in all departments

The Statistics and Comparisons of Students' Leaves, Lateness and Absence in Different Semesters

By the statistics and comparisons of students' leaves, lateness and absence in different semesters, the school can clearly understand the trends of students' attendance and lateness rate. Certainly, the school should take actions to increase and stabilize students' attendance and decrease their absence or lateness rate.

Semester

Average of Leave

department	official leave	personal leave	medical treatment leave	funeral leave	late come	absent	total
Business management gp.	50.1	12.0	19.8	-	4.2	4.4	62.1
International Business Administration gp.	47.1	5.6	12.7	10.0	3.4	2.6	51.3
Data Process group	37.4	9.0	15.1	13.2	4.7	6.4	47.1
Business Information application gp.	89.8	7.2	21.3	-	3.7	5.2	105.8
High School	46.5	9.1	10.6	18.9	2.7	2.4	53.9
總計	48.4	9.0	13.4	16.8	3.7	4.0	57.1

Count of Leave

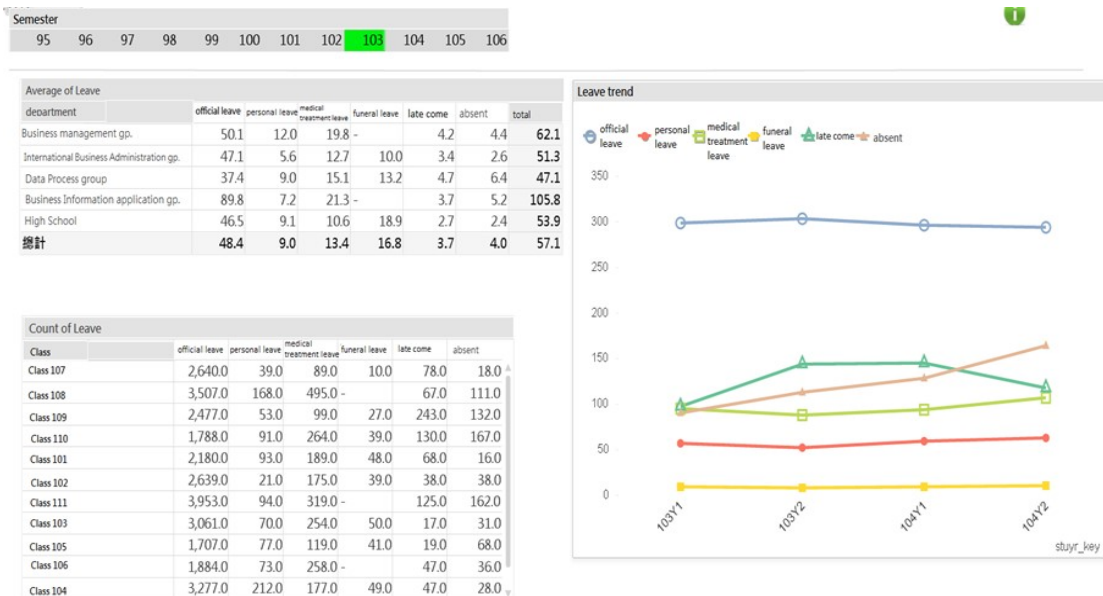| Class	official leave	personal leave	medical treatment leave	funeral leave	late come	absent
Class 107	2,640.0	39.0	89.0	10.0	78.0	18.0
Class 108	3,507.0	168.0	495.0	-	67.0	111.0
Class 109	2,477.0	53.0	99.0	27.0	243.0	132.0
Class 110	1,788.0	91.0	264.0	39.0	130.0	167.0
Class 101	2,180.0	93.0	189.0	48.0	68.0	16.0
Class 102	2,639.0	21.0	175.0	39.0	38.0	38.0
Class 111	3,953.0	94.0	319.0	-	125.0	162.0
Class 103	3,061.0	70.0	254.0	50.0	17.0	31.0
Class 105	1,707.0	77.0	119.0	41.0	19.0	68.0
Class 106	1,884.0	73.0	258.0	-	47.0	36.0
Class 104	3,277.0	212.0	177.0	49.0	47.0	28.0

Leave trend

Figure 7. The statistics and comparisons of students' leave, lateness and absence in different semesters

CONCLUSION AND SUGGESTIONS

Conclusion

We apply an experiment of IR, aiming to provide evidence-based decision making support to student recruitment policies and school management strategies successfully. Also, this study contributes to explore the potentials and limitations of IR on guiding school management strategies. Our IR model contains 4 modules and 25 analysis pages and this well-designed model actually makes contribution to students' recruitment and management strategies.

Suggestions

Based on our research, we offer empirical suggestions to school management as follows:

Set up a unit to take responsibility for IR researches

With this IR research unit's establishment, stable resources and personnel can be invested in IR research and certainly good quality and quantity of IR researches will be able to be expected.

Make more efforts on students' learning and life adaptation

Students' performance of learning and life adaptation is the key indicator of school accountability. More efforts on students' learning and life adaptation researches are suggested.

Teachers' teaching quality is also an important topic needing more researches

Teaching quality will influence students' academic and school life adaptation directly and we suggest that more researches on teachers' teaching quality ought to be done in the future.

Long-term researches will offer more meaningful information for school management and IR researches' continuity is also necessary

We suggest all of the students' academic performance, students' life adaptation and teachers' teaching quality need long-term researches to produce more meaningful and useful information for school management. With good quality, quantity and long-term IR researches, a school will benefit a lot from those researches and a well-functioned school will be possible.

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