How to Implement Innovative Education in Senior High Schools?: From an Entrepreneurial Leadership Perspective

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Abstract
In the rapidly changing global environment, innovative education in senior high schools serves as an important connecting link in the process of cultivating talents, and the leadership of principals is also the core of school reform. Therefore, the purpose of this study is to explore how to develop innovative education in senior high schools through the entrepreneurial leadership of principals. Based on this, this research starts from the concept of entrepreneurial leadership and innovative education, and constructs the indicators of entrepreneurial leadership of senior high school principals. It uses research methods such as expert interviews, expert focus group discussions, and Fuzzy Delphi. The study obtains the following conclusions: 1. The entrepreneurial leadership of senior high school principals can be divided into five dimensions (general entrepreneurial leader behavior, explorer behavior, miner behavior, accelerator behavior, integrator behavior) and 49 indicators; 2. General entrepreneurial leader behavior (GELB) is the most important dimension of the entrepreneurial leadership of senior high school principals.

Keywords: Entrepreneurial Leadership, Innovative Education, Senior High School

Introduction

Principal leadership plays an important role in the development of innovative education in the internal and external environment (Eyal & Kark, 2004; Eyal & Inbar, 2003; Park, 2012). What exactly can the principals do, and make that be the key to the development of innovative education? Especially in today's environment of increasing uncertainty, principals need to have entrepreneurial leadership skills, as well as the knowledge and ability to execute innovation education. The research on the relationship between principals' entrepreneurial leadership and school innovation education is still relatively rare (Park, 2012). However, a few studies have pointed to a significantly high correlation between principals' entrepreneurial leadership and innovation education (Pihie, Asimiran, & Bagheri, 2014; Pihie & Bagheri, 2013). Based on this, facing the rapid international changes, innovative education has become the key to a country's development of international competitiveness. Senior high school innovation education is an important link in cultivating innovative talents, and the leadership of principals is also the core of school reform. Therefore, this research aims to establish the indicators of principals' entrepreneurial leadership, so as to become a guide for leaders to develop innovative education of senior high school.

Entrepreneurial Leadership Model

Pihie et al. (2014) used the entrepreneurial leadership questionnaire (ELQ) of Thornberry (2006) to explore the structure of entrepreneurial leadership. It divides leaders into two categories, namely *activist* and *catalyst*; the leaders is also divided into two different types, *internal* and *external*; the leader role is further divided into four dimensions: *explorer*, *miner*, *accelerator*, and *integrator*; and the combination of these dimensions is called *general behavior*. Among the entrepreneurial leadership models, the Thornberry (2006) model explains leadership behaviors at the individual and organizational levels. The activism role involves the leader's personal behavior, while the catalyst role involves the leader's organizational behavior. Activist leaders play an active role as key entrepreneurs, taking the first step to seek opportunities for advancement without waiting for others. Conversely, catalyst leaders cannot directly drive the reformation, they need to create a supportive environment that stimulates innovation, new ways of doing things, and innovative action among followers. According to the Thornberry's model, miners and explorers are classified as activists, while accelerators and integrators act as catalysts.

Although the entrepreneurial leadership models of Gupta et al. (2004) are more commonly used, most of their research are not about the educational organizations. In the field of education, although researches based on the Thornberry (2006) models are still very rare, the models have been preliminarily verified for their applicability in the educational environment (Pihie et al., 2014; Yusof, 2009). In addition, the dimensions covered by the Gupta et al. (2004) models include the entrepreneurial leader's ability to respond to challenges, absorb uncertainty, and advocate, enable members to recognize opportunities to create sustainable competitive advantage for the organization, emphasize motivating members and mobilize resources to inspire members to achieve organizational vision goals; and in order to improve organizational work performance and competitive advantage, entrepreneurial leaders also need to seek and identify new opportunities, and take action to take advantage of these opportunities (Chen, 2007; Gupta et al ., 2004; Huang, Ding, & Chen, 2014; Kyndt & Baert, 2015; Thornberry, 2006). In fact, most of these views are covered in Thornberry's (2006) models. It can be seen that Thornberry's model is more suitable for school education research. Therefore, this study will take this as a basis to develop the indicators system of

entrepreneurial leadership of senior high school principals. The actions that can be divided into five role levels are defined as follows:

1. General entrepreneurial leader behavior (GELB): The principal exhibits entrepreneurial behavior and establishes a favorable atmosphere for the school to support innovative behavior, so that the innovative thinking, behavior and achievement of faculty members become part of their daily work.

2. Explorer behavior (EXPB): It means that leaders discover and seize new opportunities to improve organizational creativity and performance. In a school, it represents the principal's willingness to work hard to explore new ideas and opportunities to improve the school, working closely with networks inside and outside the school to build on the school's own strengths and overcome its weaknesses.

3. Miner behavior (MINB): It refers to the behavior of leaders when they adopt innovative methods to solve problems, which expand the organization's competitive advantage by adopting innovative methods to members, systems and processes. In the school environment, MINB means that the principal will not limit himself and wait for the opportunity, but will make changes through a series of internal administrative actions to make the school more competitive and efficient.

4. Accelerator behavior (ACCB): Leaders take good use of skills and focus on encouraging their followers to embrace innovative behaviors and ideas, thereby developing an innovative environment for members. In a school setting, principals motivate staff to develop innovative ideas and actions, demonstrate creativity and innovation in the implementation of educational tasks, and provide a supportive environment for them to experiment with innovative approaches.

5. Integrator behavior (INTB): Leaders apply their innovative spirit and thinking to the entire organization by effectively organizing overall actions to promote organizational goals. In a school, the principal is responsible for obtaining resources and funds from outside the school to establish a system with innovative education support, conveying the vision and mission of innovative education to all teaching staff, and integrating, communicating and coordinating resources to realize the school's vision of innovative education.

Method

This study uses the Thornberry (2006) Entrepreneurial Leadership Model to construct the indicators of the entrepreneurial leadership of senior high school principals. In order to develop an questionnaire tool with high reliability and validity, the "expert interviews" will be adopted, and 5 principals who have been recognized for their leadership, as well as 5 scholars in the field of related research on principals' leadership will be selected. A total of 10 experts from Taiwan will join. After the first draft is established, the above 10 experts are invited to conduct "expert focus group discussions" to collect their opinions on the connotation and dimensions of the principal's entrepreneurial leadership, After holding 2 expert symposiums, the first draft of the questionnaire of the Fuzzy Delphi survey of principals' entrepreneurial leadership indicators is developed. Finally, Fuzzy Delphi analysis is adopted, and triangular fuzzy numbers are used to measure and integrate expert opinions, in order to construct an index system for the entrepreneurial leadership of senior high school principals, and the Fuzzy Delphi expert group is also composed of the above 10 experts.

Results

After synthesizing relevant theories and literature, and the opinions of "expert interviews" and "expert focus group discussions," the index topics for the entrepreneurial leadership of senior high school principals are established as shown in Table 1. Then, according to the results of the experts' questionnaire and applying the Fuzzy Delphi operation steps of Ishikawa et al. (1993), Microsoft Excel is used to obtain the geometric mean of the most conservative cognition score (Ci) and the most optimistic cognition score (Oi), Min and Max values, as well as the test value Mi-Zi which is calculated from the difference between Oi and Ci (Mi) and the gray zone value (Zi), and the expert consensus value (Gi), as shown in Table 2.

Table 1: **Dimensions and indicators of entrepreneurial leadership of senior high school principals**

Dimension	No.	Indicator
General entrepreneurial leader behavior (GELB)	1-1	The principal breaks through the limitations of the school system in a timely manner and completes innovative educational goals and tasks.
	1-2	The principal has the demonstration ability and action force of innovative education.
	1-3	The principal pays attention to the improvement of school effectiveness and sets challenging strategic goals for the development of school affairs.
	1-4	The principal creates an atmosphere of entrepreneurial innovation in the school.
	1-5	When the original innovation approach doesn't work, the principal can instantly overcome obstacles with different approaches.
	1-6	The principal presents entrepreneurial spirit in the development of school affairs.
	1-7	The principal actively avoids the consumption of innovation energy caused by the bureaucratic system.
	1-8	When the school is carrying out innovative reforms, the principal is willing to listen to the suggestions of other different voices.
	1-9	Principals develop innovative characteristics according to new education trends.
Explorer behavior (EXPB)	2-1	The principal properly analyzes school affairs information and studies new strategies for the future development.
	2-2	The principal takes the initiative to check the school's weaknesses and find out countermeasures to overcome them.
	2-3	The principal listens to the complaints or suggestions of the stakeholders and adopts improvement strategies actively.
	2-4	The principal actively devises the innovative ways to develop the school.
	2-5	The principal motivates the staff to come up with innovative ways to develop the school's characteristics to enhance the school's competitiveness.
	2-6	The principal explains to the competent authority about the school's idea of promoting innovative education, and strives for the approval and support of the competent authority.

	2-7	The principal clearly communicates to staff the strengths, weaknesses, opportunities, threats (SWOT) of the school, and the strategies to respond.
	2-8	The principal actively identifies, develops and pursues new opportunities for school development.
	2-9	The principal leads the teaching staff to actively apply for government or private experimental or innovative plans to develop new school characteristics.
	2-10	The principal grasps the essence of the new curriculum, and systematically develops a distinctive school-based curriculum.
Miner behavior (MINB)	3-1	The principal communicates with the competent authorities firmly and professionally, so that the competent authorities can better assist the school to run the school affairs smoothly.
	3-2	The principal looks for innovative ways to manage, operate or rearrange school hardware & software equipment, and resources.
	3-3	The principal ensures that all school stakeholders are considered when staffs are doing changes to the school.
	3-4	On faculty work affairs, the principal can come up with innovative ways, and get twice result with half the effort.
	3-5	The principal analyzes workflows, resources and procedures to understand how to enable staff to do their jobs better and faster.
	3-6	The principal expects staff to identify and balance issues of competition and cooperation across schools.
	3-7	The principal supports staff in making changes to improve the school's outdated operating mechanism.
Accelerator behavior (ACCB)	4-1	The principal encourages staff to be entrepreneurial and innovative.
	4-2	The principal encourages staff to challenge the status quo and strive for change.
	4-3	The principal listens to and supports staff suggestions to improve the school.
	4-4	The principal encourages and supports staff doing innovative reform at work.
	4-5	The principal inspires staff to develop professional communities, learn new skills, and provide support.
	4-6	When the new school development goals fail to achieve the expected results, the principal will quickly find the crux of the problem and solve it.
	4-7	The principal inspires staff to think about how to carry out teaching, classroom management, administration, school activities, etc. in innovative and effective ways.
	4-8	The principal encourages staff to work hard to share their innovative ideas to inspire colleagues.
	4-9	The principal allocates resources and schedules properly to help staff find out the way to improve school effectiveness.
	4-10	The principal plays the leader role of curriculum, actively encourages teachers to conduct new curriculum experiments, and promote teachers to develop multiple elective courses.
	4-11	The principal creates an environment where teachers can independently experiment with innovative teaching.

Integrator behavior (INTB)	5-1	The principal shapes the school's constantly changing vision for the future, driving staff committed to school innovation.
	5-2	The principal identifies, encourages and protects innovators who may think and behave differently from most faculty members.
	5-3	Principal-led school administration is fast and flexible, allowing staff to respond quickly as new development opportunities arise.
	5-4	The principal has good public relations and can introduce resources inside and outside the school in a timely manner to meet the needs of the school during innovation.
	5-5	The principal integrates internal and external resources and establishes a support system that encourages continuous improvement and innovation.
	5-6	The principal can respond quickly to remove obstacles as promoting school reform,.
	5-7	The principal encourages open communication and ideas sharing across divisions.
	5-8	The principal enables the school to understand and practice new educational trends and approaches to enhance students learning and achievement.
	5-9	The principal leads the administrative team to integrate the many reform proposals put forward inside and outside the school, and formulates implementation strategies and steps.
	5-10	The principal pushes schools to focus on developing core strategies, and makes staff support new educational initiatives more.
	5-11	The principal strives for additional funding to fund and support the implementation of innovative ideas within the school.
	5-12	The principal can vertically integrate and utilize the resources of junior high schools and colleges to achieve the common goal of prosperity with the community.

Table 2: **Weight value and ranking of the dimensions and indicators**

Dimension	Weight Value	Ranking	Indicator	Gi	Weight Value	Ranking
General entrepreneurial leader behavior (GELB)	0.204	1	1-1	7.47	0.0203	28
			1-2	7.93	0.0216	4
			1-3	7.80	0.0212	6
			1-4	7.44	0.0203	31
			1-5	7.42	0.0202	33
			1-6	7.41	0.0202	35
			1-7	7.17	0.0195	45
			1-8	7.93	0.0216	3
			1-9	8.03	0.0219	2
Explorer behavior (EXPB)	0.200	3	2-1	7.38	0.0201	38
			2-2	7.47	0.0203	29
			2-3	7.40	0.0202	36
			2-4	7.35	0.0200	41
			2-5	7.59	0.0207	13
			2-6	7.21	0.0196	44
			2-7	7.46	0.0203	30

			2-8	7.65	0.0208	9
			2-9	7.53	0.0205	22
			2-10	7.38	0.0201	38
Miner behavior (MINB)	0.196	5	3-1	7.01	0.0191	48
			3-2	7.04	0.0192	47
			3-3	7.59	0.0207	14
			3-4	7.16	0.0195	46
			3-5	7.71	0.0210	7
			3-6	6.88	0.0187	49
			3-7	8.09	0.0220	1
Accelerator behavior (ACCB)	0.198	4	4-1	7.23	0.0197	43
			4-2	7.64	0.0208	10
			4-3	7.37	0.0200	40
			4-4	7.56	0.0206	18
			4-5	7.64	0.0208	11
			4-6	7.51	0.0204	24
			4-7	7.65	0.0208	8
			4-8	7.49	0.0204	26
			4-9	7.24	0.0197	42
			4-10	7.42	0.0202	34
			4-11	7.53	0.0205	21
Integrator behavior (INTB)	0.201	2	5-1	7.59	0.0207	14
			5-2	7.43	0.0202	32
			5-3	7.52	0.0205	23
			5-4	7.49	0.0204	25
			5-5	7.57	0.0206	17
			5-6	7.55	0.0205	19
			5-7	7.91	0.0215	5
			5-8	7.62	0.0207	12
			5-9	7.54	0.0205	20
			5-10	7.39	0.0201	37
			5-11	7.59	0.0207	14
			5-12	7.47	0.0203	27

Among them, in the part of the gray zone test value Zi, the Zi in this study is greater than 0, indicating that the gray zone exists. If Mi > Zi, indicating that the opinions of experts tend to be consistent and the indicators have reached convergence. If Mi < Zi, it means that the opinions of experts are too divergent, and the index has not reached convergence. In this study, for the convenience of calculation, Mi is subtracted from Zi, and if the value is greater than 0, means the index has reached convergence, if its value is less than 0, means the index has not reached convergence, and it will be deleted. All the verification values of Mi-Zi are greater than 0, indicating that the expert opinions are concentrated and the convergence degree has been reached. In the part of the expert consensus value Gi, since the expert consensus value is an important factor in the selection of indicators, Gi is the intersection of the max value of Ci and the min value of Oi, when the higher Gi, the higher the degree of consensus, and the higher importance. Therefore, this study will use 6 as the threshold for deletion of indicators. Table 2 shows that the expert consensus value Gi of each indicator in this study is higher than the threshold value 6 set in this study, so they are all reserved.

The indicators of entrepreneurial leadership initially proposed in this study were finally determined as five dimensions and 49 evaluation indicators after a questionnaire survey by Fuzzy Delphi by experts, as shown in Table 1. Since the importance of each dimension and indicator is different, the expert consensus value Gi is converted into the hierarchy relative weight value, and the relative weight results of each hierarchy in this study are calculated, as shown in Table 2. From Table 2, it is shown that in the dimensions of entrepreneurial leadership in this study, the weight values of each dimension are in order of "GELB" (0.204), "INTB" (0.201), "EXPB" (0.200), "ACCB" (0.198), "MINB" (0.196). The relative weight value of "GELB" dimension is the highest. As for the indicators, the top three are "3-7" (0.0220), "1-9" (0.0219), "1-8" (0.0216), the importance of these three indicators is the highest among all.

Conclusion

This research divides the entrepreneurial leadership of senior high school principals into five dimensions: GELB, EXPB, MINB, ACCB, and INTB. The relative weight of the GELB dimension is the highest, and it can be seen that the importance is the highest. The spirit of GELB is to require principals to exert entrepreneurship and infect all members of the school, so that all members can seek opportunities to create value for the school without being limited by existing resources, and through innovation to meet the needs of the school's development goals, and promote the growth of the school. This is also the core of the implementation of innovative education in senior high schools. Therefore, through the joint implementation of entrepreneurship by the principal and school members, a solid foundation for innovative education in schools will be laid.

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