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Design of a Metrics for Teaching Quality on Cram Schools Business

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Abstract: Due to the pressure of fierce competition, many parents worry about their children being unable to compete with their peers. Besides the regular school class, they have engaged their kids at the cram school in order to strengthen the performance of their academic or creative art, so they might have a better foundation. The cram school business thus becomes a unique and prosperous educational business. Due to the low entry barrier, many companies have joining this business. However, the declining birth rate makes cram school business facing decreasing students number in recent years. Therefore, developing effective practices to improve students retention rate and to improve competitive advantages are becoming critical for managers of cram schools. The first step to change the cram school competition environment from cost-driven to quality-driven is to establish a way to measure the teaching quality — as there is no metrics during the past few decades in this domain. This work proposes a metrics based on the theory developed by Marsh and elaborated their idea to design a teaching quality assessment mechanism. Experts in academia and cram schools were interviewed to revise the proposed framework and the associated weighted values of elements in all dimensions of the framework were further calculated using Analytic Network Process (ANP) process. Questionnaires were distributed to representative teachers and supervisors in the cram school to justify the proposed metrics. The results show that this proposed metrics are valuable to the managers and could be used to improve students retention rate.

Key words: teaching quality; Analytic Network Process (ANP); cram school
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1. Introduction

Cram school industry plays an important role in the current academics system. In the early days, it was easy for cram school to recruit students since the enhancement program could improve students' academic or other skills performance significantly. Students recruitment starts to become a big challenging due to the low fertility and the increasing number of cram schools in recent years. Besides seeking for students (customers), how to increase the business value and to retain students has become critical issues for managers in the cram school business.

Crosby, Evan, & Cowles (1990) deemed the service quality as the necessary requirement for customers to repurchase. The concept of student retention is similar to customer repurchase intention. In practices, both parents and students expect cram school to provide better teaching quality and to meet their needs of learning. However,

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there is no related research framework, based on our survey, to report the quality metrics in cram school industry. So, to improve the teaching quality, the first step is to design a quality metrics. This work proposed a metrics evaluate teaching quality based on previous related research and the inputs from domain experts. The developed metrics is further verified using empirical data to justify its feasibility.

2. Literature Review

2.1 Briefing of Educational Quality

Traditionally, parents' expectation of kids' learning performance has created a hug business for cram schools. In practices, managers of cram school have spent most of the time to recruit students and teachers, and used pay system to retain teachers, whom could attract students to join the school or stay in. There is no complete metrics on the education system to measure the quality of teaching in the cram school industry in general. Beeby (1966) mentioned that quality of education reflects the quality of teachers and qualified teachers are fundamentally relative to education quality. In 1993, Edward proposed a metrics including four quality imperatives to take a proactive stance on quality of education:

1) The moral imperative: The customers and clients of the education service are students and they deserve the best possible quality of education.
2) The professional imperative: Educators have a professional duty to improve the quality of education and to have an obligation to meet the needs of students by employing the most appropriate pedagogic practices.
3) The competitive imperative: Educationalists can meet the challenge of competition by working to improve the quality of their service and of their curriculum delivery mechanisms.
4) The accountability imperative: Educational institutions have to demonstrate that they are able to provide students education with quality.

Chao (1997) proposed if education is regarded as a production system, "teaching quality" could be considered as the extent to which the customers are satisfied by the output of education system. Hoy & Miskel (2001) emphasized on "teaching" as the technical core of school education and duties for administrators were to support teaching activities in order to improve teaching quality. Teaching certifications from the National Board of Professional Teaching Standards (2016) also suggested that an outstanding teacher should not only encompass the habits of mind in terms of knowledge but should also be well-equipped with habits of practice in terms of their teaching skills. Spooren, Brockx, and Mortelmans (2013) suggested that stakeholders in teachers' evaluations should include teachers, students, administrators, and decision-makers, whom should provide their opinions and participation in designing the evaluation metrics. Golding & Adam (2016) proposed should teachers adopt an approach that focus on the educated, they would thus be able to accept the opinions from the educated and to improve their own teaching habits. In general, evaluating teachers' teaching has a significant positive impact on improving teaching quality (Floden, 2017). Based on the aforementioned research, it can be derived that "teaching quality" is a broad field covering the software and hardware facilities from the whole education system as well as the individual behaviors, professional knowledge and in-class performance of teachers. Interaction between the teachers and the students in the teaching process is obvious a key element of teaching quality. This work aims at the facet of "the teaching quality of the teachers" as the major concern for elaboration.

Marsh (1982) developed a metrics to teaching quality named "Student's Evaluations Educational Quality

Instrument" (SEEQ) to assess teaching quality. SEEQ evaluates teaching quality through nine dimensions (as shown in Table 1) and is widely accepted in the educational-related literatures. However, the target of SEEQ is mainly on senior high school students and undergraduates, which are quite different compared to students attending cram schools. We would therefore extend the teaching quality metrics developed by Marsh and further elaborated it with the inputs of educationalists and experts in order to construct a framework to assess teaching quality for cram school industry.

Table 1 SEEQ Facets Proposed by Marsh

Dimensions	Elements
1. learning	Have the students learnt and understood from the course and teaching?
2. Enthusiasm	Is the teacher able to motivate students' learning abilities?
3. Organization	Is the course organized and taught in a clear manner?
4. Group interaction	Have the teacher encouraged students to ask, respond and interact with classmates?
5.Individual rapport	Have the teacher given friendly support and guidance to each individual student?
6. Breadth	Have the teacher provided explanation of the background and prior knowledge of teaching topic?
7. Examinations	Are the teacher's grading system appropriate and examinations could reflect the result of learning?
8. Assignments	Are the assignments given by the teacher fit the contents taught in class?
9. Overall	Is the degree of difficulty for the content taught in class appropriate?

2.2 Characteristic of the Cram School Business

There is no physical commodity for cram school business to sell, while the service they offered is the course and cultivation of manner. Lin (2009) pointed out the difference between the cram school business and general business is the "invisible knowledge" that a cram school sells. Cram school business takes the "educational service" as the commodity thus professional teachers, creative spirit, perfect teaching context, and excellent communication so as to survive the competitive market are key elements. In other word, cram school business is a service business. The "service quality" mentioned in regular business can also be applied to the "teaching quality" of the cram school business, where the goal is to bring repeated transaction through customer satisfaction.

Crosby, Evans, & Cowles (1990) stated that the essential condition for repeated transaction lied on the service quality. Therefore a good service quality will be the requisite for repurchase intention of the customers. Kotler (1999) also mentioned the repurchase intention or recommendation to others by the customers themselves relied on the service quality of the supplier. Chiu (2016) found out that better interpretation of service quality enhanced customers' emotional attachment to a place, thereby increasing their repurchase intention. Lan, Chen & Wang (2014) concluded that improved service quality was positively related to perceived value, customer satisfaction, customer loyalty, and repurchase intention. Studies on restaurant service quality conducted by Tsai et al. (2011) and Chang (2017) both suggested that improving service quality has a positive effect on customers' repurchase intention. Huang & Li (2012) also pointed out that customers' repurchase intention was one of the key factors in the sustainable operation of businesses as improved repurchase intention allowing businesses to maintain essential operations.

Kotler (2003) pointed out the characteristic theory of service business could be classified into four categories, which are intangibility, inseparability, heterogeneity, and perishability. These facets could be elaborated for a cram school business:

1) Intangibility

The product in a cram school offered is the "educational courses" without a physical body, so it is hard to be sensed or touched by the customers who will more likely to purchase the course at the spur-of-the-moment.

2) Inseparability of Manufacturing and Consumption
General business product may be manufactured, distributed and consumed later, but at the cram school business, manufacturing and consumption happened simultaneously, where the consumers may have participated in the process of production. In this way, cram school providers may design appropriate courses according to the needs of the students and their parents. They may also take into consideration of the consumer's comments to adjust the contents of the course.

3) Variability of Service Quality
At the cram school, teachers offer the teaching service to the students, while the learning quality and the degree of seriousness of the students varied among individuals. Thus the teaching quality is hard to have a consistent standard.

4) Perishability of Service
This means the service is unable to be stored. If one did not purchase the course at the very beginning, then he/she will be unable to connect the learning and has to wait for the next term, while the effect of service will be eliminated.

3. Methodology and Data Analyses

3.1 Educational Quality Metrics

With the aim to increase student retention rate (repurchase intention), cram school businesses recognize the need to improve teachers' teaching quality (service quality) in order to compete with other businesses. As teachers are usually mature and independent persons, their teaching attitudes, values, concepts, teaching objectives, as well as teaching professionalism and efficiency, have an effect on performance aspects of student abilities and behavior. In this work, SEEQ, the teaching quality facets developed by Marsh (1982), is adopted as the basis to measure teaching quality, together with the added items based on the interviews with educators and experts in cram school business. Background information of these experts is shown in Table 2. The proposed framework of teaching quality metrics is shown in Figure 1.

Table 2 Experts' Background Information

Code number	Work experience	Position	Industry
Expert 1	More than 20 years	Owner	Cram school operator
Expert 2	11 to 20 years	Teacher	XX Junior High School
Expert 3	More than 20 years	Chief executive	Cram school chain operator
Expert 4	More than 20 years	Head officer	Cram school institution for public welfare
Expert 5	More than 20 years	Director	Cram school operator
Expert 6	11 to 20 years	Teaching director	XX Junior High School Teaching Unit
Expert 7	More than 20 years	Principal	XX Junior High School
Expert 8	More than 20 years	Director	Cram school chain operator
Expert 9	More than 20 years	Professor	XX University
Expert 10	More than 20 years	Chief executive	Kindergarten cram school chain

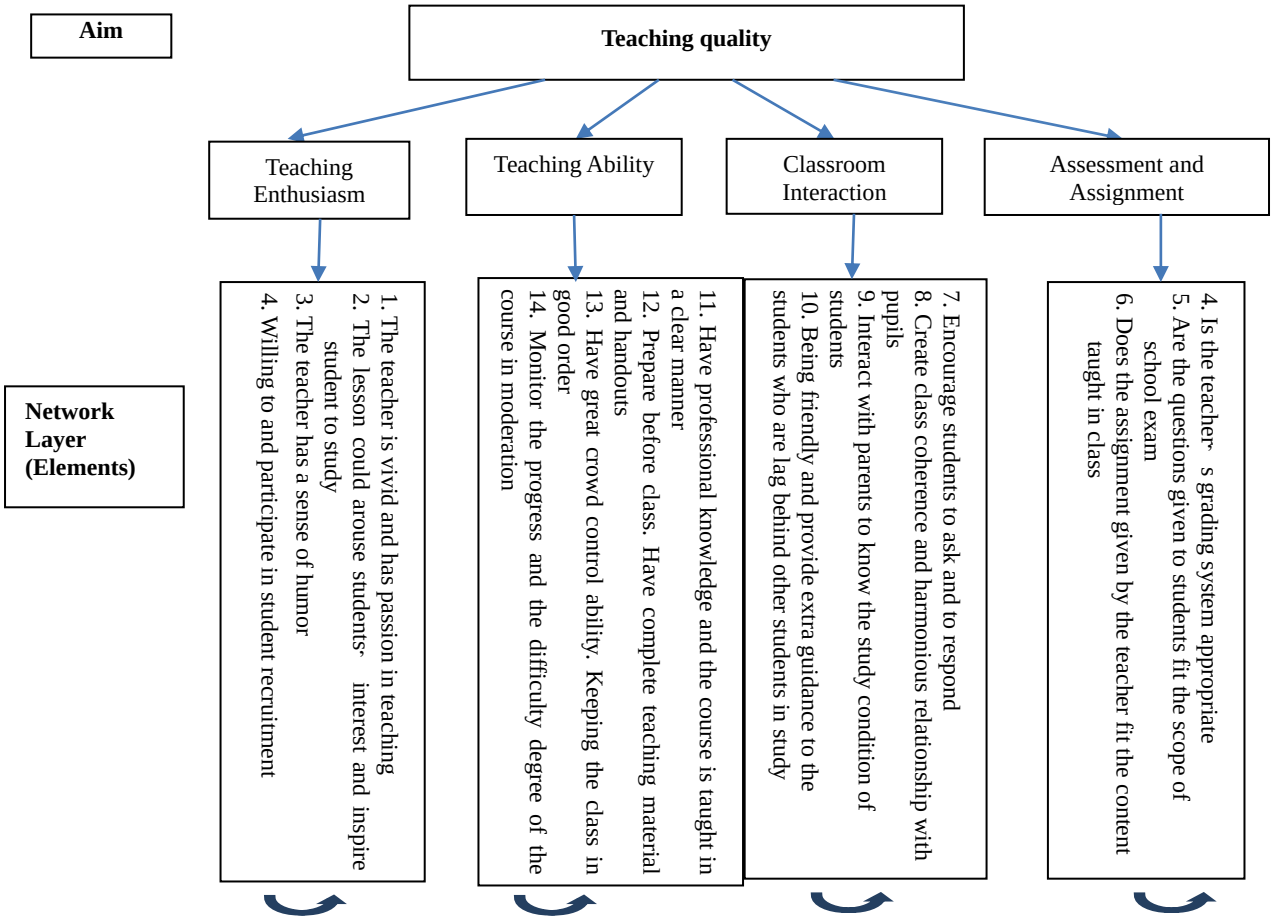

Figure 1 The Framework of Teaching Quality Assessment

3.2 Weight Calculation Using ANP

In the proposed framework, the "importance" of each facet might be different and weight for each facet should be determined. ANP (Analytic Network Process) is used to evaluate the weights which conduct pair-wise comparison of two criteria firstly, and the ultimate super matrix is used to calculate the final weights of each facet and factor.

3.2.1 Analytic Network Process (ANP)

This work adopts Analytic Network Process (ANP), proposed by Saaty at 1996, which is an extension of Analytic Hierarchy Process (AHP). The steps of ANP are as follows.

1) Set the goal and criterion structure

   This step coordinates the related elements and finds out the relations of the network and hierarchy of the interdependency among the problem target, the decision criterion, and the secondary criterion.

2) Pair comparison of the interdependency groups

   Proceed with the pair comparison of a pairwise criterion. There are two ways of comparison, one is pair comparison among different criterion, and the other is the pair comparison within the same group of the secondary criterion.

3) Consistence test

After weights are calculated, consistence test is performed. If the C.I. and C.R. value ≤ 0.1, it meets the requirement for consistency, while C.I.< 0.2 is the maximum permissible value (C.I. stands for Consistence Index,

and C.R. stands for Consistence Ratio).

4) Super matrix formation

Upon going through the pairwise comparison, the characteristic vector value of each criterion at the control level as the weighted value of the sub-matrix is calculated, and the value of the sub-matrix could form the super matrix.

5) Calculate the limit super matrix

To classify the types and characteristic of the super matrix, let the weighted super matrix times the multiple powers until the number at each column is equal to a stable and convergent limit value. The "limit super matrix", which is the final weighted value of the elements at the matrix, is found.

3.2.2 Assessment scale and Sample questionnaire

As shown in Figure 1, the aim of assessment is divided into control level and network level. Pair-wise comparison between facets, elements and group elements are then performed to evaluate their importance. Questionnaires are distributed to educationalists and experts to justify the relative importance comparisons. Table 3 illustrates the difference between the scale whereas Table 4 shows the sample questionnaire.

Table 3 Assessment scale with Corresponding Definition and Explanation

Assessment Scale	Definition	Explanation
1	Equally Important	When the level of contribution for two comparison criteria are equally important ● Equally
3	Slightly Important	Experience and judgment show a slight tendency toward specific criteria ● Moderately
5	Quite Important	Experience and judgment show a strong tendency toward specific criteria ● Strongly
7	Important	Reality shows a very strong tendency toward specific criteria ● Very Strong
9	Very Important	Enough evidence shows absolute tendency toward specific criteria ● Extremely
2、4、6、8	Median value of neighboring scale	Between compromise value

Source: Saaty (1996).

Table 4 Sample Questionnaire

Please assess the degree of relative importance between different facets.

Please compare the degree of relative importance of "Teaching enthusiasm", "Teaching ability", "Classroom Interaction" and "Assessment and Assignment" for teaching quality.

Facet A	Degree of relative importance																	**Facet B**
	Very Important		Important		Quite Important		Slightly Important		Equally Important	Slightly unimportant		Quite unimportant		Unimportant		Very unimportant		
	9	8	7	6	5	4	3	2	1: 1	2	3	4	5	6	7	8	9	
Teaching Enthusiasm																		Teaching Ability
																		Classroom Interaction
																		Assessments and assignments
Teaching Ability																		Classroom interaction
																		Assessments and assignments
Classroom Interaction																		Assessments and assignments

4. Results and Discussion

4.1 Weights and Overall Ranking of Facets and Associated Element

In the proposed framework, there are four facets for teaching quality assessment and 15 elements for each facet. Results of the weights of facets and elements are placed in sequence of importance (as shown in Table 5). Based on Table 5, "teaching enthusiasm" facet accounts for the largest proportion of weights (44%), "teaching ability" comes second (29%), and the rest accounts for small proportion. Teachers' enthusiasm and their teaching ability are the focus for managers to improve teaching quality therefore.

The most important element criterion analysis under each facet is as the followings:

1) Under the facet of *teaching enthusiasm*: "teachers with enthusiasm, teaching with vitality" have been the most important elements.
2) Under the facet of *teaching ability*: "professional knowledge, clear course lecture" have been the most important elements.
3) Under the facet of *class interaction*: "encouraging students to ask questions and answer their questions" and "creating classroom centripetal force and harmonic interaction between the students and teachers" have been the more important elements.
4) Under the facet of the *assessment and homework*: "Whether teacher's questions can get a hold with the exam questions at school" is the most important element.

Table 5 Weights and Overall Ranking of Facets and Each Element

Facets	Element	Weights	Ranking	Proportion of the facets	Ranking
Teaching enthusiasm	Vivid and passionate in teaching	0.127745	1	0.443591	**1**
	Able to arouse students' interest in studying	0.119393	2		
	Teacher has a sense of humor	0.114055	3		
	Participate in activities and coordinate student recruitment	0.082398	5		
Teaching ability	Have professional knowledge and the course is taught in a clear manner	0.101696	4	0.294247	**2**
	Prepare before class and have complete handout for class	0.065791	7		
	Great crowd control ability and able to maintain order in class	0.073594	6		
	Keep pace with the class progress in moderate	0.053166	8		
Classroom interaction	Encourage students to ask and reply to the question	0.048239	9	0.174689	**3**
	Enhance coherence, harmonious relation	0.047978	10		
	Interact well with parents	0.039730	11		
	Friendly caring for each and every students	0.038742	13		
Assessment & assignment	Appropriateness of grading method	0.022274	15	0.087473	**4**
	Questions given to students fit the scope of school exam	0.039280	12		
	Assignments meet the contents taught in class	0.025919	14		

In Figure 2 we have further taken the overall weights into consideration to see the priority for assessing the teaching quality element criterion of the teachers. The most important elements in sequence are: “vivid and passionate in teaching”, “inspire students learning”, “sense of humor at the classroom”, and “have professional knowledge”. These elements are belonging to different facets. Therefore, for a “suitable” teacher, one should be passionate in teaching (very subjective perspective) and also possess professional skill (very objective perspective) in both ends. To enable teachers in both ways are therefore important to ensure teaching quality of a cram school.

Figure 2 Weight of Each Teaching Quality Assessment Element

4.2 Discussion

Traditionally, many managers evaluate the teaching quality of teachers simply by assessing how they “feel” towards the teacher’s suitability, making it difficult to gain an in-depth understanding of the difference in teaching qualities of different teachers. A detailed framework with weighted values of facets and elements is designed in this research for the purpose of allowing managers to use this metrics to evaluate teachers’ teaching quality objectively.

From a managerial perspective, “teaching enthusiasm” is the most important facet, which is following by the “teaching ability”. Since “ability” is something that can be developed, but the enthusiasm more or less comes from nature. So, besides carefully recruit potential teachers with enthusiasm, many cram school chains provide teachers training and qualification programs to equip teachers with solid teaching abilities. On the other hand, teachers must have teaching “enthusiasm” in order to bring classroom atmosphere energetic. To inspire learning and arouse students’ motivation in studying is also a critical facet for managers to evaluate teachers’ teaching quality. In addition, it is worth noting that under this facet, a high weighted value is given to teachers who are “highly cooperative and involved in students recruitment” — teachers with excellent teaching abilities might also

need to participate in students recruitment. In practice, teachers and students have direct interaction, and students view their teachers as a model whose words and behavior have strong impact on students. Therefore, managers generally expect teachers to be highly cooperative and participate in students recruitment.

Furthermore, managers rank "great crowd control ability in class" as an important facet which is different from traditional schools. A disorderly or noisy classroom could result in a negative impression from the parents and would hence make it have bad images on cram schools. Moreover, students who are motivated to study may not be able to focus in class due to the disorder in the classroom thereby impact the reputation of the cram school.

5. Concluding Remarks

The number of students' enrollment determines the success of a cram school business, where the student retention rate is as important as new student recruitment. Student recruitment requires substantial manpower and financial support which have always been more difficult compared to student retention for cram school managers. Although student retention may be a result of many uncontrollable external factors, teaching quality is the key factor that the cram schools can control and improve. To first step to improve the teaching quality is to establish a quality metrics.

A framework to measure teaching quality is proposed in this work. The proposed framework is based on Marsh's SEEQ and includes the specific characteristics of cram school. An empirical study is performed in order to determine the specific weight of each facet and associated elements using ANP. Based on the results of this work, it is concluded that passionate and vivid with professional knowledge of the teachers are critical to ensure teaching quality. For the managers of cram school, both objective and subjective ways should be adopted to enable their teachers to improve their competency.

To improve teaching quality aggressively is an important strategy for managers to survive in this era of low fertility. That is, "quality improvement" should be emphasized instead of "cost competition" or other approaches. Rather than making large investments in contriving all kinds of recruitment strategies that will inevitably lead to price-cutting competition, managers should recruit those teachers that are enthusiastic in teaching and train them to enable their teaching capability. In this way, teaching quality could be improved and managers can apply Plan-Do-Check-Act continuous improvement process in a cram school to have better competitive advantages.

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