



## Optimizing an immersion ESL curriculum using analytic hierarchy process

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### ABSTRACT

The main purpose of this study is to fill a substantial knowledge gap regarding reaching a uniform group decision in English curriculum design and planning. A comprehensive content-based course criterion model extracted from existing literature and expert opinions was developed. Analytical hierarchy process (AHP) was used to identify the relative importance of course criteria for the purpose of tailoring an optimal one-week immersion English as a second language (ESL) curriculum for elementary school students in a suburban county of Taiwan. The hierarchy model and AHP analysis utilized in the present study will be useful for resolving several important multi-criteria decision-making issues in planning and evaluating ESL programs. This study also offers valuable insights and provides a basis for further research in customizing ESL curriculum models for different student populations with distinct learning needs, goals, and socioeconomic backgrounds.

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### 1. Introduction

English learning is explicitly announced by the Research, Development and Evaluation Commission (RDEC) under Taiwan's Executive Yuan as one of the major ways to boost the efficiency of the workforce, and also a leading factor toward increasing international competitiveness (RDEC, Executive Yuan, Taiwan, 2002). Starting in 2005, English education in Taiwan's elementary schools had been extended from the fifth grade to the third grade. Despite years of effort made by the central government in response to the impact of globalization, the rural–urban divide as a global phenomenon has reflected on the discrepancy in educational quality in Taiwan, including English language education (Chang, 2004; RDEC, Executive Yuan, Taiwan, 2002). Taoyuan County located 20 miles southwest of Taipei City has relied mainly on local fiscal capacity and local effort to fill the gap between demand and underfunding of educational resources available from the Central Government. In year 2009, Taoyuan County government devoted as high as 42% of its total fiscal expenditure to education; nevertheless, the amount of educational expenditure still fell behind the amount allocated to the urban areas in Taiwan (Ho & Sheu, 2008; Ministry of Education, Taiwan, 2009). To help minimize the rural–urban differences in the provision of English as a second language (ESL) education, the Department of Applied English at the Taoyuan campus of Ming Chuan University, since 2008, has implemented a one-day situational ESL educational initiative, intending to serve neighboring elementary school

children from under-resourced schools in Taoyuan County. To date, more than 3500 children from 19 elementary schools in Gueishan Township, Taoyuan County have experienced the one-day ESL situational learning (Ming Chuan University & Gueishan Township Office, 2009). The department seeks to improve upon this educational endeavor by means of expanding the one-day situational ESL learning into a one-week immersion ESL program in an effort to retain and foster Taoyuan elementary school students' communicative competency and motivations in learning English.

When it comes to the one-week curriculum design, at issue is that second/foreign language teaching has involved a considerable body of educational philosophies, and the quest for ideal principle and beliefs has been part of its tradition. Various approaches to second/foreign language teaching and curriculum design have been contributed by psychologists, linguists and practitioners over the years (Richards & Rodgers, 2001). Obviously, those approaches to second language teaching and curriculum design very much celebrate the linking of a linguistic theory and a learning theory which are now very familiar at least by names: structural approach, functional/notional approach, situational approach, skill-based approach, task-based approach, and content-based approach (Krahnke, 1987; Nunan, 1991). Despite all the differences among the various approaches and their philosophical roots, overall they embody the same idea: an 'approach' does exist, which can be stretched to motivate the ultimate goal towards the "communicative competence" (Sauvignon, 2002; Song, 2009).

Given the fact that there are a myriad of courses and linguistic competences underlying different approaches to be included in the one-week immersion ESL program, curriculum developers of the one-week immersion ESL program decided to make an optimal decision based on possible course criteria developed from existing

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literature. Since the importance attached to an immersion ESL curriculum differs between learning contexts, between institutions and between individuals, questions would arise concerning how to develop an optimal immersion ESL program for a specific group of elementary school students. The purpose of the study, therefore, was to develop a comprehensive course criterion model based on existing literature and expert opinions for decision making about an optimal immersion ESL program. The modified Delphi method and Analytical Hierarchy Process (AHP) were then adopted to identify the relative importance of criteria for selecting seven courses as a daily routine in the optimal one-week immersion ESL curriculum for a specific group of elementary school students in Taoyuan County.

## 2. Literature review

The literature review section describes previous studies using AHP in multi-criteria optimization, curriculum planning/course selections, and theoretical foundation of various ESL curriculum approaches used for hierarchy model building.

### 2.1. Attribute ranking and multi-criteria optimization using AHP

As a multi-criteria decision-making technique, AHP can be used for a wide variety of decision problems including synthesis and optimization (Saaty, 1995). A plethora of studies have been conducted using AHP to find solutions for ranking attributes, determining the optimal alternative, and synthesizing performance indicators. For example, in one of the earliest research, AHP was modified as a validated method to synthesize the most desirable criteria for judging the potentialities and opportunities of licensing oncologists (Ross & Nydick, 1994). Delphi technique and AHP was used in an exploratory study to rank critical success factors contributing to effective quality engineering tools and techniques (Puri & Yusof, 2009). In an earlier study, AHP was utilized to prioritize the relative importance of four critical factors and sixteen sub-factors for implementing total quality management for the state-owned enterprises and the foreign joint ventures (Chin, Pun, Xu, & Chan, 2002). Optimization of a set of composite sustainability performance indicators that addresses the sustainable performance of steel industries was determined using AHP in a study undertaken by Singh, Murty, Gupta, and Dikshit (2007). AHP was further employed to weight and prioritize leading attributes that measure dental service quality, policy efficiency of Green Information Communication Technology, and personal trainer performance (Chiu, Lee, & Lin, 2010; Hsu & Pan, 2009; Shim, Kim, Cho, Park, & Lee, 2009). In the field of educational research, AHP analysis was performed to identify the relative weights of factors that influence school organizational innovation (Hsiao, Chen, Chang, Chou, & Shen, 2009). Through information from the Delphi and AHP surveys, the best industry-orientated management curriculum alternative was proposed to confirm the education direction for undergraduate students (Lin, Lin, Chiu,

Hung, & Chen, 2010). On the basis of afore mentioned studies, it is concluded that the normalized and unique priority vectors of weights with the aid of AHP technique is capable of ranking and prioritizing core factors, attributes or criteria associated with multi-criteria decision-making and optimization problems for the purpose of eliciting the best alternative or evaluating infinite sets of potential alternatives or scenarios. For this research, AHP was chosen as a suitable preliminary research method because the resulting priority weights will determine the relative importance of individual 1st-order course criteria and 2nd-order course criteria, and in turn identified the best composition of seven desirable courses to create the one-week immersion English program.

### 2.2. The application of AHP to course selection and curriculum planning

Despite the abundance of studies regarding the use of AHP to deal with multi-criteria decision making in management, economics, marketing, and engineering, only several studies have applied it to decision making on curriculum design, course selection and program evaluation. So far, studies regarding ESL course offering decision making are scarce. However, results of studies utilizing AHP in curriculum design and course selection do provide a basis to construct the research framework of this study. Studies using AHP in curriculum design and course selection are listed in Table 1. Those studies, like other AHP studies, all involved multiple criteria that sometimes appeared to be conflicting.

In the above studies, AHP, as a decision support aid, was used to prioritize criteria for course selection and curriculum planning. The literature contains other interesting research studies of AHP applications in education settings as well. For example, Mamaghani (2010) addressed the evaluation and selection of textbook for courses in the management information science field. The application of analytic network process (ANP), a variation of AHP, has gained popularity in educational research. Fan, Du, and Sheu (2010) presented the use of ANP in evaluating life insurance curriculum performance. The ANP was also utilized in developing performance measure based on the balanced scorecard (BSC) scheme for extension education centers in universities (Wu, Lin, & Chang, 2011).

### 2.3. Approaches to ESL curriculum design

As noted earlier, the astounding diversity of ESL curriculum approaches are still available to us presently. In order to assess the value or effectiveness of methods, it is necessary to consider them in relation to a language program having specific goals, objectives and characteristics (Tchudi, 1991). The objective of the one-week ESL immersion program is to help subjects enhance communicative competency in the English language with the fundamental aim of building up interests and motivation in learning English (Ming Chuan University & Gueishan Township Office, 2009). To achieve the objective, a group of 9 ESL experts familiar with the educational mechanism in Taoyuan were recruited as curriculum

**Table 1**  
Application of the AHP in previous studies on curriculum design and course selection.

Area of study	AHP applications	Author(s) and year published
Industry engineering education	Prioritizing a undergraduate curriculum using AHP	Frair, Matson, and Matson (1998)
e-commerce security courses	Incorporating the Delphi method and the AHP method	Kim, Han, Kim, and Choi (2005)
Introductory programming courses	Using AHP to facilitate the selection of a programming language	Parker, Chao, Ottaway, and Chang (2006)
Life insurance sales representatives training	Incorporating grey relation analysis and AHP	Fan, Tsai, and Lee (2008)
Risk management and insurance	The modified Delphi method and AHP	Fan, Sheu, Wang, and Lee (2008)
Decision making about e-learning implementation	Prioritization of e-learning options using AHP	Begičević, Divjak, and Hunjak (2007)
An industry-oriented management education model	To provide optimized management learning course module based on Delphi and AHP surveys	Lin et al. (2010)

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