Measuring the effectiveness of English Medium Instruction Shipping courses

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Abstract

Purpose

Shipping courses contain much technical and specialist knowledge and present particular challenges for English Medium Instruction (EMI). This paper investigates both student perceptions of the importance and satisfaction level of EMI in shipping courses in higher education in Taiwan and the perceptions of expert stakeholders through qualitative interviews.

Methodology

Importance-Performance Analysis (IPA) is used to gather data on participants' perceptions of what is (un)important and (un)satisfactory. Based on past studies, four dimensions with 20 items were developed and 121 effective questionnaires collected. Further, qualitative interviews with expert stakeholders (n=9) are undertaken to gather data to contextualize and complement the quantitative student data.

Findings

Findings show students attributed high importance but low satisfaction to items such as

course learning objectives and students' English level, and low importance and high satisfaction to items such as electronic teaching platform and relevance of subject to practice. Factor analysis and cluster analysis were used to divide samples into three groups. Qualitative interview results confirm many of the quantitative findings but also show where some quantitative findings require more attention or investment when delivering EMI programmes.

Research limitations

Questionnaire samples focus on university students. Other related field samples (e.g. EMI teachers, shipping teachers, English teachers, etc.) could be surveyed and compared in future studies. Qualitative interviews could also be expanded to other stakeholders such as government policy makers.

Practical implications

The findings of IPA in the shipping courses and the qualitative interviews can be used for both teaching design and implementation in related courses by University Lecturers and other Stakeholders (e.g. Policy and Decision-makers). Such approaches can enhance students' learning motivation and teaching performance.

Social implications

This paper provides important guidance and diagnosis for how to introduce English teaching in Shipping courses. Related courses can be further applied in Higher Education to popularize and promote EMI teaching in Shipping and related fields.

Originality/value

EMI has seldom been studied in the context of shipping courses in the past. This paper adopts IPA method and qualitative interviews to complement previous studies and address gaps in recent research. It is expected that the research findings could be adapted and applied in other fields.

Keywords: English Medium Instruction, Importance-Performance Analysis, Factor Analysis, Higher Education, Shipping Courses

1. Introduction

In non-English speaking countries, English Medium Instruction (EMI) has now become mainstream within ~~much~~ Higher Education (HE) (Lin and~~&~~ Morrison, 2010; Hendriks et al., 2018) and in Maritime related and Shipping Courses (Tseng *et al.*, 2018). Critical

to the success of EMI is to ensure it is equally effective as instruction in the~~ir~~ native language when delivering subject content to students, and ensuring the availability of sufficiently qualified teachers to deliver subjects in English. It is also key that motivation to undertake subject content study in English is there ~~both~~ for both lecturers (to deliver materials) and ~~also for~~ students (to learn from it) (Ball and~~&~~ Lindsay, 2012). Although ~~on the one hand~~ this might appear to be common sense, many~~a number of~~ studies illustrate the importance of motivation in success in ~~a number of~~ contexts ranging from community college success (Martin, *et al.*, ~~Galentino & Townsend,~~ 2014) to music (Asmus Jr, 1986) and~~, specifically,~~ EMI (Doiz, *et al.*, ~~Lasagabaster & Sierra,~~ 2012).

For students who later~~go on to~~ work in the shipping industry, it is essential ~~that~~ they have a strong command of English (Pallis and~~&~~ Ng, 2011) and keep abreast of~~up to date with~~ International Maritime Organization (IMO) guidelines (Karahalios, 2017) should they wish to become seafarers, staff in shipping companies, shipping forwarders, shipping agents, ship-brokers or work for port authorities. Many~~ international conventions and regulation rules drafted by the~~ ~~International Maritime Organization~~ ~~(~~IMO~~)~~ guidelines and many trade documents are~~ written~~ in English~~. To be a professional maritime management expert, a well-grounded English level in education training is necessary regarding listening, speaking, reading and writing~~. Indeed, English

is the international language of the shipping industry, and it is thus relatively straightforward to see why EMI should be so appealing to universities in the context of education on shipping and maritime courses.

It is against this background and context that ~~the~~ EMI ~~course that~~ is the focus of this paper ~~was developed, and has been running for three years before the data was collected~~. A total of 123 students participated on the EMI course in the year studied, all were from Taiwan and aged between 18 and 22, and from this group 121 effective questionnaires were gathered. They were studying at undergraduate level, and most were studying Transportation Management, although some students were studying Aerospace and System Engineering, Foreign Language and Literature, or Finance. They were mostly first year undergraduates although students from later years also participated. Also, expert stakeholders teaching EMI (n=3), teaching English (n=3) or working as shipping operators (n=3) were interviewed to gather their perceptions and to contextualise the quantitative findings.

In this paper we use the mathematical approach of IPA (Martills and~~&~~ James, 1977) and qualitative interviews (Qu and Dumay, 2011). We use IPA to identify and understand the importance level and the satisfaction level of students in regard to a number of measurement items related to EMI in shipping and maritime courses before

conducting factor and cluster analysis on the findings. The method of IPA was originally developed in a marketing context, and first used in service and product improvement in the service industry. Today, it is widely used in engineering, tourism, transportation, medicine, construction and other areas, and is suitable for social science, operations management and many other fields. In terms of what it does, IPA fulfils a role somewhat akin to a course evaluation by identifying what aspects of a course students consider to be important or unimportant, and what aspects of a course they consider perform well, or are satisfied with (or not). By juxtaposing these results regarding importance and satisfaction it is possible to identify which aspects students may feel satisfied with, and at the same time also identify which aspects they feel unsatisfied with and which they feel are important. In essence, this means results are grouped into four quadrants as 'I - Concentrate here' (high importance and low satisfaction); 'II - Keep up the good work' (high importance and high satisfaction), 'III - Low priority', (low importance and high satisfaction) and 'IV - Possible overkill' (high importance and high satisfaction). These quadrants underpinned four key research questions for us: What elements do students perceive to require additional focus for development? What elements do students perceive require similar focus and attention? What elements require minimal attention? And: What elements should we not focus time on to free up resources for other areas? The answers to such questions can provide

results that can then help policy makers, teachers and course developers make decisions on where to prioritise time and resources to further develop EMI ~~and focus EAP~~ delivery~~practices~~.

Any IPA is done through the use of a range of measurement items, which, although it is not necessary for them to be categorised, where appropriate this can be done, and the key items can be categorised into key areas for development. In this way, IPA provides information that decision makers can use in order to best decide how to invest resources. In this paper, we categorized four key areas and divided 20 measurement items into these four areas. These 20 measurement items were then judged by students in terms of their 'importance' and their 'performance' (or here 'satisfaction') by participants in a questionnaire. From these responses, in our analysis of the results we were able to identify those measurement items which were judged to be of high importance but also of low satisfaction, and to suggest the investment of more resources into these. In other words, the method allowed us, in the context of EMI for shipping and maritime courses, to gather student perceptions regarding the areas they considered needed the most resources and attention in future courses, and what they considered already worked well. IPA thus operates as an effective method to help in evaluation and needs analysis.

We alsonote that our undertook qualitative interviews with expert stakeholders to complement the results fromuse of the IPA method used to gatherhere is purely based on students' perceptions, and that it would be useful to expand and compare with teachers' perceptions as well. Although studentsWe note furthermore that it can be argued that students may not be the most appropriate judges of what is most effective in pedagogical terms (McKeachie, 1979), we are able in this paper through the expert stakeholder interviews to compare and complement their perceptions.. However, we stress that our intention here is to help improve pedagogy specifically in the field of EMI for shipping courses, but also, by extension, for EMI on other courses. Furthermore, to complement existing methods and approaches to help ensure this through theour use of IPA herewhich is, as far as the authorswe are aware, the first time it has been used in this context.

The remainder of our paper is structured as follows. First we review literature in the field of EMI, specifically with the intention of illustrating how we identified the measurement criteria we used in the IPA.. Following this we describe in more detail the methodology we used for the IPA, factor analysis and cluster analysis, and for the qualitative interviewsspecifically here with a view to doing so in order for others to be able to replicate our use of the approach. SubsequentlyFollowing this we present and analyse our results in relation to what the students we consulted felt to be items of the

most and least importance and those they were most and least satisfied with, and also present and analyse our results from the expert stakeholder interviews. Finally, we draw together the main points by way of suggestions for those working in EMI, and those deciding on how best to allocate resources for EMI.

2. Literature Review

2.1 EMI Related Studies

In a ~~specific~~ shipping context, a key issue ~~is~~ for any course, and EMI courses by implication, is to remain abreast of the latest shipping developments (Ng *et al.*, ~~et al.,~~ 2009; Grewal and~~&~~ Haugstetter, 2007) and to teach international shipping guidelines (Ng and~~&~~ Yip, 2009). In an EMI study, Tseng *et al.* ~~et al.~~ (2018) used a fuzzy analytic hierarchy process to explore considerations of the key EMI factors in the shipping courses of Taiwan's higher education. Results showed~~found~~ that teachers' characteristics was the most important indicator, followed by syllabus design, university resources and students' characteristics~~. In another study that has considered the role of accents in how lecturers are considered in EMI, from the perspectives of Dutch and German students, Hendriks et al. (2018) showed that lecturers with moderate non-native English accents were evaluated less positively than those with less of an~~

~~accent~~. In this paper, our focus is on highlighting key items and variables for EMI courses to use through our IPA and to explore with expert stakeholders. We now draw on a number of studies to do this for EMI shipping and maritime courses. Throughout we describe both the factors and explain the rationale behind our decision to select them.

2.2 Key dimensions and items in EMI Course

Based on a number of past studies (e.g. Cui, 2010; Fu, 2010; Lavinia *et al.*, ~~et al.,~~ 2012; Huang, 2015; Tseng *et al.*, ~~et al.,~~ 2018; Richter, 2019), four dimensions with 20 items were developed for the IPA. These four dimensions were 'Course Objective and Content'; 'Learning Resources'; 'Students' Learning Characteristics' and; 'Teachers' Teaching Characteristics'. We now describe these dimensions and the items developed for the IPA ~~that were~~ for~~included in~~ each of them.

2.2.1 Course Objective and Content

T~~At a very fundamental level, t~~he course objective of ~~English in the context of~~ the course we draw our data from here, entitled Maritime English, is to introduce the global maritime market and the operation management processes within it (Agai-Lochi, 2015; UNCTAD, 2019~~8~~). Key stakeholders in the maritime industry include shipping liner companies, port operators, shippers, freight forwarders, logistics operators, and others.

In consideration of these different stakeholder groups, course content mainly contains liner shipping, tramp shipping ~~(where ships are engaged in trade with no fixed schedule or published port of call)~~, ports and cargoes, bill of lading ~~(a document issued by a carrier to acknowledge the receipt of cargo for shipping)~~, international conventions and so on (Brodie, 2013; Song and~~&~~ Panayides, 2015; UNCTAD, 201~~98~~). Managerial theories that are taught ~~in maritime courses~~ include those of Strength, Weakness, Opportunities, Threats, or SWOT analyses (Menon *et al.*,~~et al.,~~ 1999) and ~~also~~ Michael Porter's five forces analysis (Porter, 1979). Tseng *et al.* ~~et al.~~ (2018) found that course material, learning strategies, and learning assessment are important elements of syllabus design in EMI. Further, the content of EMI should meet the needs of students in order to ensure the quality of teaching and outcomes (Nguyen *et al.*, ~~et al.,~~ 2016). ~~These theories and others are introduced to illustrate the shipping/port operators' competitiveness~~. Based on the above studies, six measurement items can be developed in the Criteria of Course Objective and content as follows: course learning objectives, course learning materials, course learning motivation, relevance of subject to theory, relevance of subject to practice, and learning assessment methods.

2.2.2 Learning Resources

There are many ~~types of~~ learning resources in universities, ranging from traditional textbooks to digital and website learning platform resources, and face-to-face meetings

with tutors. Nguyen *et al.* ~~et al.~~ (2016) suggested that ~~the~~ textbook selection for EMI ~~course~~ should prioriti~~e~~se English texts published in English speaking countries (e.g. UK, US, Australia). Further, when the university supports English education activities, this can provide a positive incentive for EMI courses development (Emrije, 2015; Kong and Wei, 2019). Also, online resources (e.g. discussion forum, blogs, etc.) should be provided to strengthen learning effectiveness in EMI (Karakas, 2019). In Taiwan, similarly to many countries, most universities have modern educational technologies (e.g. electronic teaching and iLearn 2.0 learning platforms) for their courses (Brill and~~&~~ Galloway, 2007). These platforms can be used for downloading course materials, uploading assignments, course discussions, and so on~~.~~ (Cui, 2010). In Taiwan, also similarly to other universities elsewhere, most university classrooms have computers, multimedia, Internet service, and projectors and screens for web-teaching.

Instructors provide office hours (about four hours per week) to help students through~~for~~ academic ~~counseling~~counselling (Limberg, 2007). Also, the university library contains the required learning resources (e.g. books, journals, dissertation, DVD, digital collection, etc.) for courses ~~learning~~, which~~and~~ are increasingly electronic in format (Rockinson-Szapkiw *et al.*, ~~et al.,~~ 2013). In addition~~Also~~, the university can ~~further~~ conduct partnership with foreign university in the US or UK to strengthen learning resources and EMI teaching performance (Nguyen *et al.*, ~~et al.,~~ 2016). Tseng *et al.* ~~et al.~~

(2018) suggested that university should support enough teaching and learning resources for EMI course development, such as classroom facilities, availability of assistance, and incentives for teachers. What is perhaps unique to a Taiwanese context however, is that to provide extra teaching support, course instructors can assign one teaching assistant/tutor (commonly a Masters student) to help students. It is believed that such relevant course provision can strengthen learning topic scopes and depth. Based on the above studies, four items are developed: electronic teaching platform, classroom facilities, availability of assistance, and wide variety of relevant courses.

2.2.3 Students' Learning Characteristics

Generally, students' learning backgrounds (e.g., English level, shipping knowledge, learning habits and strategies) and a possible perceived unfairness connected with a feeling of being forced to study in English might affect their learning performance in EMI courses (Kim *et al.*, ~~et al.,~~ 2014; Tseng *et al.*, ~~et al.,~~ 2018; Kong and~~&~~ Wei, 2019). Saarinen and~~&~~ Nikula (2013) note that some countries required students to provide results of English tests (e.g. TOEFL or TOEIC) when they would like to participate in EMI courses. Indeed, one much-debated issue relates to whether students' English abilities are sufficient to participate in EMI courses (Airey *et al.*, ~~et al.,~~ 2017). In a Chinese context, Jiang *et al.* ~~et al.~~ (2016) found that understanding students' motivation and needs are important when implementing EMI courses. In a Korean

context, Lee and& Lee (2018) noted that course program evaluation (including students' needs) should be a concerned in an EMI context. Such factors are fundamentally important as considerations. The type of English will also be specific to shipping and maritime courses, and involve both specific terminology, and key underlying elements (Pilcher and Richards, 2016) that influence the meaning of the language in context. Shipping knowledge is also key, and thoses for students to come to the courses with much knowledge arguably are better equippedwould mean they were off to a better start than others who had very little. For maritime related EMI courses, students might be in a stronger position forreduce learning barrier if they have previously followed always learnt other maritime, shipping or port related courses before (Tseng *et al.*, et al., 2018). Also, both student approaches to learning and also their strategies may be key, especially those developed in the classroom itself. Based on the above studies, five items are developed: students' shipping knowledge, students' English level, incentives for students, students' involvement in learning, and students' learning strategies.

2.2.4 Teachers' Teaching Characteristics

Generally, teachers should have a thorough background in terms of teaching topic and English proficiency level (including listening, speaking, reading, writing) when conducting EMI courses (Costa and Coleman, 2013; Nguyen *et al.*, et al., 2016; Tseng *et al.*, et al., 2018; Karakas, 2019). It is arguably more important they have the necessary

subject level knowledge than the English (PilcherRichards and RichardsPilcher, 2017) but both are essential, and both can be critical in how the teaching is perceived by students (Hendricks *et al.,* et al., 2018). Arguably, staying abreast ofkeeping up to date with the latest developments (Bhadury, 2016) and elements such as IMO guidelines is also key (Yang *et al.,* et al., 2013). In additionAlso, EMI teachers should have sufficientenough English knowledge to teach the course content and provide the feedback or responses to the students' questions (Freeman *et al.,* et al., 2015). Lasagabaster (2018) suggested that team teaching can be implemented in the EMI course, such as the collaboration of between language and content teachers. In order to attract students' course interests and learning motivation, teachers' active encouragement also plays a fundamentally important role (Poon, 2013). MoreoverAlso, effective discussion and feedback between students and teachers are key elements to achieve better teaching and learning performance. Also, if the teachers have related EMI experiences before, they will understand students' common learning barriers and needs in the teaching process (Tseng *et al.,* et al., 2018). Teachers' teaching skills are also believed important in the EMI implementation (Karakas, 2019). For example, English needs to be effectively adapted for communication with students in the classroom. Based on the above studies and ideas, five items are developed: teacher's shipping knowledge, teacher's English level, teachers' active encouragement,

classroom interaction, and feedback, group discussion in the classroom.

We summarize these criteria and measurement items into Table 1 below. We note the dimensions, the items and also related sources here in Table 1: Importance-PerformanceSatisfaction (here we substitute Performance for Satisfaction given the context) Analysis item list.

<INSERT Table 1>

3. Methodology

In this paper, one EMI-based course, entitled Maritime English, was chosen to explore students' self-assessment regarding importance and satisfaction perceptions. This course is an optional course and most students who have registered for this course were junior students. There was no prerequisite course– needed before registering for this course. The main content includes liner shipping, tramp shipping, ports, ships, shipping document (e.g. Bill of Lading), shipping operation costs, containerisation, international conventions, and so onetc. Students' evaluation methods included class participation, a mid-term and a final exam, and one term-project. In previous research, many scholars have indicated IPA as a suitable methodology to explore study participants' thinking (through importance and performance analysis) regarding a specific issue and any

actual perceptions and gaps relating to how well the issue isn being managed. Similar studies using IPA have been implemented in many fields, such as Oh (2001) and Lai and& Hitchcock (2015) in Tourism Management. The research purposes of this current study aims to understand important dimensions when implementing EMI courses and then further explore participators' importance perception and level of satisfaction regarding developed dimensions and items. Therefore, the IPA model was adopted in this study to identify and develop course improvement strategies. It is noted that "performance" was substituted with "satisfaction" in order to fit the research purpose here. The IPA model was divided into four quadrants with satisfaction on the X-axis and importance on the Y-axis. These four quadrants were: 'I - Concentrate here'; 'II - Keep up the good work', 'III - Low priority', and 'IV - Possible overkill' (Martills and James, 1977). Generally, the quadrant that it is important to focus on is the quadrant 'I - Concentrate here'. This is because the 'I - Concentrate here' measurement item shows what participants feel is both important but at the same time is something they are un-satisfied with. Such a categorization can then subsequently be used to identify whether organizational or business resource utilizations are achieving their optimal capacity. In other words, and in an EMI context, it functions as a finely tuned and accurate quantitative representation of a form of course evaluation. As noted above, IPA has been widely used for the evaluation of service, product, education, and business

management fields (Azzopardi and Nash, 2013; Sever, 2015). In education based studies IPA has been used to research Chinese students' perceptions of service quality in the context of declining numbers of students coming from China to New Zealand (Tan and Simpson, 2008). It has also been used as a tool to evaluate Higher Education Service Quality (Silva and Fernandez, 2011). In this paper we use IPA for the study of EMI in Shipping Courses, which is the first time IPA has been applied in this context, based on the knowledge of the authors.

All investigations were conducted in line with appropriate ethics procedures of anonymity (*cf.* Christians, 2011). First, bBefore conducting the questionnaire survey, two senior university teachers with extensive EMI experience were invited for interview to help refine the questionnaire content and by way of a pilot during 8-15 May 2018 (Van Teijlingen and Hundley, 2002). During the interview period, a formal invitation letter was provided for interviewee. Interview process steps, interview outlines, and academic ethics descriptions weare all stated in this invitation letter via face-to-face communication. Before conducting a formal interview, participants' agreement was gained. Transcripts of interviews were thorough and were sent to interviewees for verification. Interview questions included those such as "What do you think about the EMI in higher education courses in Taiwan?" Also, 30 undergraduate students who had EMI courses experiences were invited to conduct a questionnaire pre-

test during 28 May-1 June 2018. This helped ensure all elements of the questionnaire were easy to understand and rectifiedy any potential errors as an effective pre-test (Perneger *et al.*, et al., 2015).

Regarding how many questionnaires are commonly used for IPA studies, it is commonly the case that studies will have between 200 and 400 questionnaires. Some studies have numbers in excess of this total (e.g. Silva and& Fernandez (2011) with a total of 695), and others below (e.g. Tan and& Simpson (2008) with a total of 160). In our study, we have numbers below 200, which from one perspective is a limitation of our study, however, we note that there is no standard value with regard to questionnaire totals when using IPA. In addition, the total number of responses questionnaires we collected represented almost 100% of the possible total we could have attained once we had ruled out the ineffective responsesquestionnaires we received.

The questionnaire survey was conducted at a university in Taiwan. Questions were in the medium of English as studentsthey had learned much of the related ideas in English itself, although help was offered with any questions they had by a native speaker of Chinese (Cortazzi *et al.*, et al., 2011). The qQuestionnaire survey was conducted at the Feng Chia University in Taiwan during 1-11 June 2018. A total of 123 students[1] who

[1] These students are invited from two classes. The number of students were 60 and 63, respectively.

had taken this course were invited to complete the importance and satisfaction questionnaires for each of the 20 measurement items on a Likert five-point scale where 1 is low, and 5 is high. Of this totalese 123 questionnaires, 121 were effectively completed questionnaires and thus 121 of the 123 were used for the IPA analysis. The measurement item scores weare inputtedfilled into EXCEL software and used the grand mean of importance and the grand mean of satisfaction to establish an IPA matrix. Both these grand means weare arrived at by calculating the average value of the total Likert scale answers for each question. Then 20 measurement items weare distributed in Quadrants 'I- Concentrate Here, 'II - Keep up the Good work', 'III - Low priority', and 'IV - Possible overkill'. Also, in order to separate the samples into different groups, factor analysis and cluster analysis were used based on the item score of importance perceptions from the 121 samples.

The sample included 67 males (55.4%) and 54 females (44.6%) students and their ages were between 18~22 years old. Regarding dimensions and items, average importance and satisfaction was calculated for each dimension and item. A summary of the results is categorized in Table 2. For the four dimensions, the results show that students' learning characteristics (4.4574.446) and teachers' teaching characteristics (3.4723.372) were ranked as the highest scores in importance and satisfaction.

In order to supplement and complement the quantitative analysis data, we further interviewed nine expert interviews in our study in Taiwan. These nine experts could beare categorised into three types: EMI teachers (3), English teacher (3), and shipping operators (3). The experts' backgrounds (e.g. related EMI teaching, maritime research, and practical working experiences at 10 years at least) were reviewed in order to make ensure they were experts. Research ethics procedures and anonymity rules were followed in this study (*cf.* Christians, 2011). Expert interviews took places at interviewees' offices (or suitable places) in a face-to-face context. The interview outline was sent to interviewees in advanced to ensure they had sufficient time to prepare. Semi-structured questions were provided according to interviewees' backgrounds. Such a method allowed for the collection of more comprehensive interview information according our research topic. For example, "Do you have any comments about the EMI in our university?", "Do you have any problems when you teach EMI course(s)?", "Do you have any suggestions if university continuously to promote EMI courses in the future?". Further questions further followed based on interviewees' responses in order to explore potential research issues. The results of the expert interviews are presented in Section 4.6.

4. Results

4.1 Importance-Satisfaction Analysis

Regarding importance perceptions, the mean of each dimension is calculated by its items' average value. For example, in terms of importance, the mean of Course objective and content (4.443) is calculated by average value of Course learning

objectives (4.540), Course learning materials (4.537), Course learning motivation (4.521), Relevance of subject to theory (4.240), Relevance of subject to practice (4.241), Learning assessment methods (4.339).2 Also, the standard deviation value (SD) of the dimension is based on its SD of item. For instance, in terms of satisfaction, the SD of Course objective and content (0.122) is calculated by Course learning objectives, Course learning materials, Course learning motivation, Relevance of subject to theory, Relevance of subject to practice, Learning assessment method. Taking the Course objective and content dimension as an example, the mean and standard deviation are 4.427~~4.443~~ and 0.122, respectively (see equation 1, 2 and 3).

Mean = 4.443=(4.504+4.537+4.521+4.240+4.421+3.339~~4.427~~)/6 (1)

Standard Deviation= $\sqrt{\frac{1}{n-1}\sum_{ij}^{n}\left(X_{ij}-u\right)^2}$ ~~$\sqrt{\frac{1}{n-1}\sum_{ij}^{n}\left(Xij-u\right)^2}$~~ (2)

Where X_{ij} is the mean of each item and u is the mean of each dimension.

i is item for Course objective and content Dimension, i=1,2,3,4,5,6

j is label of participants, j=1,2,…121

~~0.122=~~

~~$\sqrt{\frac{1}{6}\left[(4.504-4.443)^2+(4.537-4.443)^2+(4.521-4.443)^2+(4.240-4.443)^2+(4.241-4.443)^2+(4.339-4.443)^2\right]}$~~ ~~(3)~~

For importance perceptions, the top three highest ranked measurement items were incentives for students (4.669), students' involvement in learning (4.636), and teacher's

[2] 4.443=(4.540+4.537+4.521+4.240+4.241+4.339)/6

shipping knowledge (4.457). Regarding satisfaction perceptions, the top three highest ranked measurement items were teacher's shipping knowledge (3.872), teacher's English level (3.810), and relevance of subject to theory (3.545).

<INSERT Table 2>

In terms of how these results can be visually represented, the grand mean of importance (4.411) and satisfaction (3.257) were used to establish an importance-satisfaction matrix (Figure 1). The grand mean of importance (4.411) is used to delineate the horizontal line for average importance across the vertical Y axis, and the grand mean of satisfaction to delineate the vertical line for average satisfaction on the horizontal X axis. This process divides the scatter diagram into four quadrants. The results from the above table can then be plotted on to the scatter diagram to show their exact positions in the four quadrants. For example, if we consider S13 Incentives for students, the mean for importance is 4.669, so we place it at 4.669 on the importance axis (Y axis) and the mean for satisfaction is 3.124, so we plot it at 3.124 along the satisfaction axis (X axis). Thus, S13, when plotted on the scatter diagram, is in Quadrant I. In this way the scatter diagram can be plotted traditionally with a pen and paper or, alternatively, it can be plotted using the 'scatter diagram function' in Microsoft Excel, as we have done here.

Based on the analysis of the results, and in relation to our research question 'What elements do students perceive to require additional focus for development?' Quadrant 'Ⅰ - Concentrate here' of high importance/low satisfaction includes seven items: course learning objectives (S1), course learning materials (S2), students' shipping knowledge (S11), students' English level (S12), incentives for students (S13), students' involvement in learning (S14), and students' learning strategies (S15). These then are the key items for prioritization in terms of what the students perceive to be critical, and the items EMI Shipping Courses developers and tutors should focus most attention on.

By comparison, and in relation to our research question 'What elements do students perceive require similar focus and attention?' Quadrant 'Ⅱ - Keep the good work of high importance/high satisfaction includes four items: course learning motivation (S3), teacher's shipping knowledge (S16), teacher's English level (S17), and teachers' active encouragement (S18). These then are areas considered of significant importance but those which students were satisfied with. Such areas as these are therefore ones that should be the focus of continued attention in EMI, but do not necessarily need further development or investment.

Following on from this, and in relation to our research question what elements require

minimal attention? Quadrant 'Ⅲ - Low priority' of low importance/low satisfaction included six items: learning assessment methods (S6), classroom facilities (S8), availability of assistance (S9), wide variety of relevant courses (S10), classroom interaction and feedback (S19), and group discussion in the classroom (S20). Here then were items students considered they were not satisfied with, but which were of low priority. We discuss these results below but immediately note here the possible bias ~~here~~ that the results are from students, and also the possible neglect of what may be considered Western style teaching methods of group discussion compared to more Confucian Heritage Culture style methods of teacher to student knowledge delivery (Tran, 2013). Although more pertinent to the discussion section below, and we ~~do indeed~~ discuss it further there, we note this here as it immediately stands out to us.

Finally, and in relation to our research question 'What elements should we not focus time on to free up resources for other areas?' Quadrant 'IV - Possible overkill' of low importance/high satisfaction included three items: relevance of subject to theory (S4), relevance of subject to practice (S5), and electronic teaching platform (S7). These are items students felt of little importance and which they are highly satisfied with. In other words, these are items which teachers may wish to reduce their focus on slightly, or at

least deal with more rapidly.

<INSERT Figure 1>

What we intend the visual representation of the matrix here to be able to do is to visually represent the quantitative data in a form that clearly highlights to those involved in EMI ~~and EAP~~ where these students see the main areas to focus resources and time towards: Quadrant I. We now conduct a more detailed factor and cluster analysis of these results and present the results from our expert stakeholder interviews before a discussion section considering all the results.

4.2 Factor Analysis

Through the use of Statistical Product and Service Solutions (SPSS) 22.0 software, factors were used to reduce the 20 items of EMI and produce smaller sets of underlying factors. This step helps identify meaningful patterns among the original items and to extract the main factors (Babble, 2013; Hair *et al.*, ~~et al.,~~ 2014). Thereby, a factor analysis with a VARIMAX rotation was employed to identify key factors.~~.~~ Here, only items with a factor loading greater than 0.5 were extracted (Hair *et al.*, ~~et al.,~~ 2014). In the primary factor analysis, a factor loading value of item 4 (Relevance of subject to theory) is less than 0.5. We surmise this item can not achieve a consistent view due to

the fact that some participants thought this item was very important whereas others thought this item was not very important. Thus, a second factor analysis is conducted again after deleting item 4 (Relevance of subject to theory), and then four factors are identified (as shown in Table 3). The score for each of the four factors was calculated for each sample and submitted to a subsequent cluster analysis. These four factors accounted for approximately 61.3% of the total variance, and are described below:

(1) Factor 1 was course objective and content factor, comprising six items: course learning objectives, course learning materials, course learning motivation, relevance of subject to practice, and learning assessment methods. This factor accounted for 33.111% of the total variance.

(2) Factor 2 was learning resource. This included: electronic teaching platform, classroom facilities, availability of assistance, and wide variety of relevant courses. This factor accounted for 11.526% of the total variance.

(3) Factor 3 was students' learning characteristics, and consisted of: students' shipping knowledge, students' English level, incentives for students, students' involvement in learning, and students' learning strategies. This factor accounted for 10.490% of the total variance.

(4) Factor 4 was teachers' teaching characteristics. This factor included: teachers' shipping knowledge, teachers' English level, teachers' active encouragement,

classroom interaction and feedback, and group discussion in the classroom. This factor accounted for 6.190% of the total variance.

Further, a reliability analysis tested whether these factors were consistent and reliable. As shown in Table 3, the Cronbach Alpha value for each factor was above a value of 0.7, thus achieving a satisfactory level of reliability (Churchill, 1991; Nunnall, 1978).

<INSERT Table 3>

4.3 Cluster Analysis

A cluster analysis with Ward's hierarchical technique using squared Euclidean –distances was used to form clusters. Based on the factor score for each of the four factors, 121 samples were separated into three groups. Here, 46 samples are in group 1 (named as students' learning orientation), 14 samples are in group 2 (named as course objective and content orientation) and 61 samples are in group 3 (named as course and teaching orientation).

4.4 One Way Analysis of Variance

One way analysis of variance was used to examine which EMI factors differed among

the three groups. Table 4 shows that four factors were found to significantly differ among the three groups. Based on Tukey's honestly significant difference and Bonferroni's tests, factor 1, factor 2 and factor 4 show significant differences among the three groups. Regarding factor 3, no significant difference was found between group 1, group 2 and group 3.

<INSERT Table 4>

4.5 Results of expert interviews

The experts we interviewed for their qualitative impressions of the current status of EMI and for their suggestions how to develop EMI were from three different groups of stakeholders: EMI teachers; English teachers and; Industry practitioners (Shipping Operators). There were a number of commonalities in their impressions. One common theme was that of internationalization. For the EMI teachers, this was related to how EMI was a *"future trend in order to achieve internationalization."* Such internationalization could be to make students more international through enhancing their subject based English proficiency (EMI teachers), or it could in addition be to develop the university internationally (English teachers). In the words of one English teacher: *"it can attract international students… and strengthen our students' English abilities…. It is an international trend."* Similarly, in industry, EMI, and English, was key. A high level of English was considered *"a very important talent in the shipping*

industry" and EMI was considered *"a good policy direction…the universities' authorities should support this policy"* as it will strengthen English abilities and also *"enhance students' job competitiveness in the future."* These perceptions align closely with Quadrant I high importance / low satisfaction areas of 'Students' English level (S12)' from the IPA results above and with much of the literature underlining the importance of English (e.g. Pallis and Ng, 2011).

Another theme that was common in the perceptions, but which does not align so closely with the IPA results was that of the association of EMI with the need for innovative teaching methods and approaches. For the EMI teachers, *"innovation or creative teaching"* was key, one commenting that they *"hope[d] EMI teacher do not use traditional teaching method in the EMI course"* and that there should be *"group discussion in class."* Also for English teachers there was the idea that *"teachers should adopt innovative and various teaching methods to attract students"*, and that *"using traditional teaching method… will bring boring feeling for students."* Similarly, industry practitioners felt that *"past teaching methods might be boring"* and, it was suggested that the *"university… might consider… inviting two teachers to participate in one EMI course… one EMI teacher… and the other [an] industrial practitioner."* On the one hand these results mirror the IPA results closely in their alignment with

items in Quadrant I such as 'students involvement in learning (S14) and in Quadrant II such as 'teacher's active encouragement (S18)'. They also align with much of the literature emphasizing the importance of keeping abreast of the latest developments in shipping (Ng and Yip, 2009). However, they appear to contradict the IPA results in connection with innovative teaching such as the item of 'group discussion in the classroom (S20) in the low importance / low satisfaction Quadrant III and IPA results related to the importance of industry content such as the 'relevance of subject to practice (S5)' in the low importance / high satisfaction Quadrant IV.

A number of tensions were also highlighted or alluded to by the interviewees, although underlying these tensions was the common theme that in order to be successful EMI requires significant investment, either in money or in policy adjustments. For example, despite one English teacher noting the higher pay for EMI teachers; *"a policy [that] aims to attract more teachers to participate EMI courses"* there still needed to be *"suitable learning environment, teaching material, and teaching methods."* However, this would mean that teachers needed to spend overly high amounts of time on developing materials in comparison to how much the higher pay compensated them for doing so. Consequently, *"teachers will feel that return of investment is low."* What is more, current policy could impact on a teacher's reputation, as, *"teachers worry that*

students will give a negative teaching evaluation if they feel the course is difficult." There was also a tension between the level and complexity of the content delivered and the level of the students' English. As one EMI teacher commented, the English content *"will be a burden for the students"* and that *"I will try to use simple English to teach them…. I will not provide difficult questions in my exam."* Also, one English teacher highlighted a concern that it was possible for any student to attend an EMI course regardless of their level of English, but that this situation *"will be a problem for the teacher since he (she) cannot fully take care every student's need."* Moreover, as noted by an industry practitioner, due to time pressures, *"some teachers sometimes forget to take care of each student because they would like to finish each chapter of the session in the class."* In short, there was a feeling from industry that investment was needed, one practitioner commenting that *"I think it will obtain good feedback if they continuously invest in EMI courses."* Although these results complement rather than compare with the IPA results above, what they do underline perhaps is that more investment in the areas highlighted above is justified.

5. Discussion

Our results above provide quantitative and qualitative data in relation to the priorities that should be accorded to resource allocation for EMI in Taiwan's Shipping and

Maritime EMI courses. We note that the quantitative data may be pseudo-quantitative because it is based on a numerical value accorded on a Likert scale which has an underpinning individual and subjective judgement to it (Pilcher and Cortazzi, 2016). In addition, the data could perhaps be considered to be pseudo-quantitative in that each individual will interpret the terms in their own way and thus the terms themselves are not necessarily objective in nature (Voloshinov, 1929). Despite these caveats, the data provide numerical and visual representations of what the average of this body of students considered of importance or not, and of what they were satisfied with or not in the context of EMI in the Shipping and Maritime courses in Taiwan. Moreover, the qualitative data from interviews with expert stakeholders complements and confirms many of the quantitative findings.

In terms of our research question 'W~~w~~hat elements should we not focus time on to free up resources for other areas?' (Quadrant 'IV – possible overkill'), these elements were either 'meta' type categories or facility based. In terms of facility based, 'electronic platform' was considered absolutely satisfactory but perhaps accorded too much attention. This could be because almost every university now has an electronic platform as the norm, or perhaps students wanted more classroom dialogue and discussion with the teacher. With regard to the 'meta' type categories, these were 'relevance of subject to theory' and 'relevance of subject to practice'. On the one hand it is affirming to see

that these were given high satisfaction as it suggests that in this context of shipping and maritime courses that relations between what was being taught in the classroom were clearly and explicitly made for the students. However, given the aspect of a perception of it being done too much, it may perhaps be considered that such linkages in the context of Shipping and Maritime courses is clear and perhaps only needs to be mentioned relatively infrequently, or perhaps not given too much attention. However, the qualitative interview results would suggest that it should continue to be done, and that perhaps it is simply the case that more explanation of its underlying rationale and value needs to be done.

Regarding our question 'What elements require minimal attention?' (Quadrant 'III – low priority') there were again areas that could be ones students considered the norm such as 'classroom facilities', or 'learning assessment methods'. What stands out for us here however, and as we alluded to above, is the low satisfaction but also low priority given to 'availability of assistance', 'classroom interaction and feedback' and 'group discussion in the classroom'. As we noted above, on the one hand this may reflect the specific Confucian Heritage Culture (Tran, 2013) in the sense that rather than group discussion in the classroom, students may desire more teacher led discussion. Yet, it appears paradoxical here that in this category was also 'availability of assistance' and

'classroom interaction and feedback'. Specifically, what appears paradoxical is the idea that these areas were only given a low priority at the same time as 'group discussion in the classroom'. A possible conclusion is that, in fact, students did not accord much importance or satisfaction with any type of interaction in the classroom. Here then, it may well be the case that they simply wanted to have materials delivered to them, and to have these delivered to them in the time allotted to the tutorials and lectures rather than outside these times, as 'availability of assistance' was also considered to be of low satisfaction and low importance. Yet, as the qualitative interviews showed, expert stakeholders felt group discussion essential to the innovative teaching methods required for EMI. Perhaps here then, as noted above, more meta-explanation of the rationale and goals of such methods would be effective both in giving a rationale to students as to why they were being done and also consequently perhaps increase student motivation for participating in them.~~Here, it would be useful we believe to explore and investigate these results with more in-depth qualitative type of methodsqualitative type methods such as focus groups or interviews to try tease out the rationale for these choices.~~

In terms of research question two, 'What elements do students perceive require similar focus and attention?' (Quadrant 'II – keep up the good work) these very much related to pedagogical aspects, and to motivation. Regarding motivation, the students' choice of course learning motivation showed the importance they accorded to having

motivation to succeed (Doiz, *et al.*, ~~Lasagabaster Sierra,~~ 2012). Regarding pedagogy, these results show the importance of the teacher's knowledge of the subject, their level of English (Tseng *et al.*,~~et al.,~~ 2018), and of the teacher's active encouragement (Poon, 2013). Interestingly, students felt both teachers' shipping knowledge and teachers' active encouragement to be of greater importance than their English level (Pilcher~~Richards~~ and Richards~~Pilcher~~, 2017). Here, as industry practitioners suggested, perhaps greater involvement of industry professionals in the EMI classes would work well.

Arguably, of most importance were the areas in relation to our research question 'W~~w~~hat elements do students perceive to require additional focus for development?' (Quadrant 'I – concentrate here'). Interestingly, many areas involved self-judgement by the students themselves. Indeed, the categories of students' shipping knowledge, students' English level, students' involvement in learning, and students' learning strategies could perhaps be said to be areas that teachers of EMI or those making strategic judgements about EMI would have little influence over. Yet, at the same time, it can be argued that indirectly they do, but that these decisions would be made regarding their shipping knowledge and English level at the point of entry. Arguably, those in charge of admissions should either highlight or make clear to students they will need a high level of both subject content knowledge ~~of the subject~~ and ~~of~~ English to be

successful. Perhaps a test could be administered based on the English in the context of Shipping. We would warn against any use of a test such as IELTS and recommend instead a shipping knowledge test in English be given (Pilcher andand& Richards, 2017). In addition, learning strategies would be something we would suggest could be helped with in the subject itself rather than in a standalone generic class (Pilcher and Richards, 2016). Notably, the expert stakeholders interviewed also considered it key that students' level be considered before they were registered for EMI courses.—

Regarding other areas accorded high importance and low satisfaction, these were ones those teaching and deciding on EMI would influence: course learning objectives, course learning materials and incentives for students. Here, the key message is that these areas be given more attention, and Shipping Course teachers play a key role investigating how such objectives could be achieved, and in their delivery. By focusing on clearly mapping out the course learning objectives for students, teachers will help convey the value of the course and make it clear to students. Yet, as all expert stakeholders alluded to, there would need to be significant investment.

—In terms of the subsequent factor analysis, item 4 (Relevance of subject to theory) was deleted since its factor loading was less than 0.05. It can be explained that maybe students thought theoreticaly elements of teaching content still important, but some

thought this content should be reduced since it is not very important in the course teaching. Regarding cluster analysis, we separated our 121 sample into three groups based on the results of a factor analysis. Group 3 (61 samples) was the major sample and they preferred "Course objective and content" factor and "Teachers' teaching characteristics" factors. Therefore, for EMI teachers, it is suggested to strengthen the description of course learning objective in the classroom and encourage them to learn more course teaching related knowledge (e.g. Maritime contextualized English, the latest ~~newest~~ shipping knowledge, interaction technique between students and teachers) in advance.

6. Conclusion

This paper contributes to the growing literature in EMI through studying student perceptions of where to prioritise resources and directions for EMI teaching, and expert stakeholder perceptions of key areas for EMI teaching. It ~~and to~~ considers the implications of these findings for teachers, decision makers and other stakeholders. It did so in the context of shipping and maritime courses in Taiwan, and through the use of an IPA approach and expert interviews. Using 121 questionnaires, this paper identifies the importance and satisfaction attached to each dimension for each item. Then, three groups were identified based on factor analysis and cluster analysis. Whilst

the IPA approach is mathematical in nature, it is, we believe, relatively straightforward to implement, as we have described above, and it is certainly an approach useful for researching EMI. It is, also, only one of a number of mathematical techniques that could be used, for example the Kano method (Mikulić and Prebežac, 2011) could also be used. Future research could nevertheless use the IPA method with more samples and course topics in different HE systems to gain deeper insights. Further, comparisons between the English used practically in the Shipping Industry or stipulated by the IMO (Karahalios, 2017) can be investigated for EMI course development and implementation.

Whilst we recognise that these findings here are specifically from the context of shipping and maritime courses in Taiwan, we argue they are of use and consideration for EMI in similar courses elsewhere, and that at the very least the theory involved transfers (Flyvbjerg, 2006). Not only this, but what the findings underline is the need for significant investment in terms of time, finance, and practicalities for EMI to be successful in the context we have studied. Although offering a higher salary is clearly a help to stimulate lecturers to undertake EMI~~Future research could use the IPA method with more samples and course topics in different HE systems to gain deeper insights. Further, comparisons between the English used practically in the Shipping Industry or stipulated by the IMO (Karahalios, 2017) can be investigated for EMI course~~

~~development and implementation. In addition, we would suggest more in-depth qualitative studies into the aspects considered by the students to complement the quantitative methods employed here in a combined or mixed method type approach to more fully understand what exactly students interpret these items to mean, and how EMI Shipping and Maritime Courses can be continually developed.~~, this may be insufficient if, as our experts alluded to above, the return on investment is not considered commensurate. In other words, the salary may be higher, but if the time needed to produce the materials is extremely high, the salary increase may not be deemed sufficient. In addition, if teachers are concerned that EMI lessons will mean they receive lower student evaluations, and also that there is a need for innovative teaching methods and adjustment of the level of the content, these may also be barriers. Particularly interesting perhaps is the mismatch between students not wanting to participate in group discussions and also feeling that industry links may be made too frequently. This contrasts greatly with the perceived need for greater innovative methods, and for greater industry links suggested by the shipping operators interviewed. Clearly, EMI cannot just be 'done' by introducing a higher salary, and needs thorough and careful evaluation, monitoring and support from a high policy level down. It is our hope that the findings outlined in the paper above can help policy makers and managers in education achieve this through suggesting directions for them to pursue, particularly

given the key role of English to this subject area.

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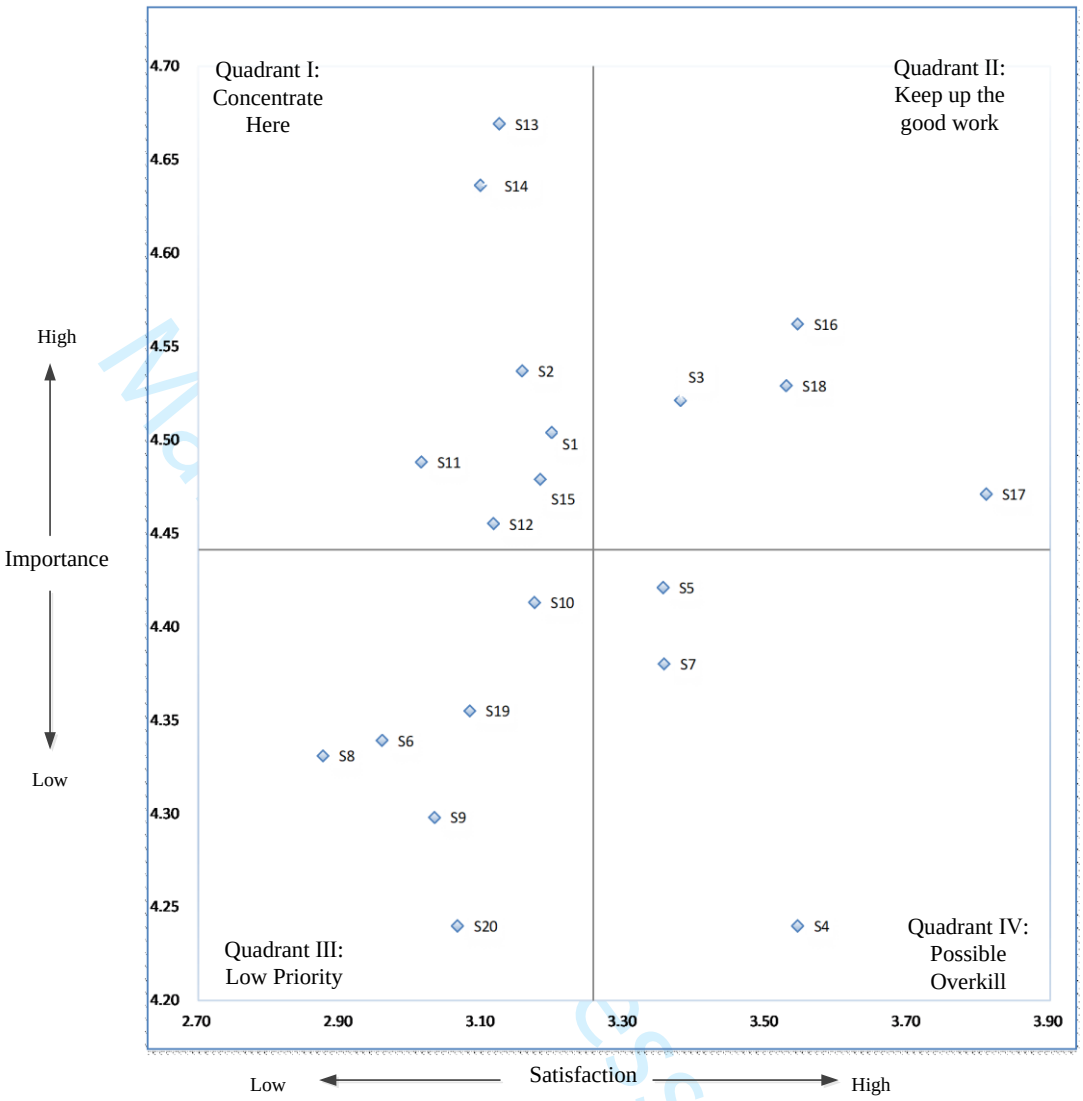

Figure 1. Importance-satisfaction analysis matrix.

Table 1. Importance-Performance~~Satisfaction~~ Analysis item list.

Dimension	Labels	Items	Source
Course objective and content	S1	1.Course learning objectives	Menon et al.(1999); Porter (1979);Brodie (2013); Clegg & Simpson (2016); UNCTAD (2017)
	S2	2.Course learning materials	
	S3	3.Course learning motivation	
	S4	4.Relevance of subject to theory	
	S5	5.Relevance of subject to practice	
	S6	6.Learning assessment methods	
Learning resources	S7	1.Electronic teaching platform	Hellekjær (2009); Kirkgöz (2009); Costa & Coleman (2013); Agai-Lochi(2015)
	S8	2.Classroom facilities	
	S9	3.Availability of assistance	
	S10	4.Wide variety of relevant courses	
Students' learning characteristics	S11	1.Students' shipping Knowledge	Lin & Morrison (2010); Poon (2013) Pilcher & Richards (2016); Pilcher & Richards (2017); Hendriks et al. (2018)
	S12	2.Students' English level	
	S13	3.Incentives for students	
	S14	4.Students' involvement in learning	
	S15	5.Students' learning strategies	
Teachers' teaching characteristics	S16	1.Teacher' shipping knowledge	Poon (2013); Costa & Coleman (2013); Goodman (2014); Huang & Singh (2014)
	S17	2.Teacher's English level	
	S18	3.Teachers' active encouragement	
	S19	4.Classroom interaction and feedback	
	S20	5.Group discussion in the classroom	

Table 2. Importance-Satisfaction rating[1].

Labels	Items	Importance			Satisfaction		
		Mean	SD	Rank	Mean	SD	Rank
Dimension	**Course objective and content**	**4.427** ~~**4.443**~~	**0.634** ~~**0.122**~~		**3.266**	**0.759** ~~**0.148**~~	
S1	Course learning objectives	4.504	0.565	4	3.198	0.586	8
S2	Course learning materials	4.537	0.517	5	3.157	0.646	10
S3	Course learning motivation	4.521	0.534	7	3.380	0.849	6
S4	Relevance of subject to theory	4.240	0.847	19	3.545	0.966	3
S5	Relevance of subject to practice	4.421	0.588	11	3.355	0.656	7
S6	Learning assessment methods	3.339 ~~4.427~~	0.653	16	2.959	0.651	19
Dimension	**Learning resources**	**4.356**	**0.706** ~~**0.040**~~		**3.155**	**0.900** ~~**0.282**~~	
S7	Electronic teaching platform	4.380	0.662	13	3.537	1.088	4
S8	Classroom facilities	4.331	0.700	17	2.876	0.678	20
S9	Availability of assistance	4.298	0.760	18	3.033	0.706	18
S10	Wide variety of relevant courses	4.413	0.703	12	3.174	0.937	11
Dimension	**Students' learning characteristics**	**4.457**	**0.612** ~~**0.077**~~		**3.112**	**0.715** ~~**0.117**~~	
S11	Students' shipping knowledge	4.488 ~~4.496~~	0.672	8	3.041	0.569	17
S12	Students' English level	4.455	0.683	10	3.116	0.635	13
S13	Incentives for students	4.669	0.506	1	3.124	0.770	12
S14	Students' involvement in learning	4.636	0.548	2	3.099	0.870	14
S15	Students' learning strategies	4.479	0.607	9	3.182	0.695	9
Dimension	**Teachers' teaching characteristics**	**4.450**	**0.664** ~~**0.060**~~		**3.472**	**0.909** ~~**0.173**~~	
S16	Teachers' shipping knowledge	4.562 ~~4.570~~	0.617	3	3.372 ~~3.872~~	1.008	1

[1] Little deviation in these questionnaire items can be possibly attributed to two factors. First, these items are all cited from past studies (see Table 1), indicating these items are important for EMI teaching issues. It is reasonably believed that most questionnaire participants will therefore make their score of each item with a score 4 (important) or score 5 (very important), and that this will result in little deviation score in importance perception. Second, each EMI teacher in the university must pass a teacher training course involving observation and reviews of their teaching materials before they can formally teach the EMI course. Therefore, it is believed the teaching quality of such an EMI course is acceptable for students and the satisfaction score of questionnaire items also show little deviation.

S17	Teachers' English level	4.471 ~~4.372~~	0.621	14	3.810	0.809	2
S18	Teachers' active encouragement	4.529	0.593	6	3.529	1.119	5
S19	Classroom interaction and feedback	4.355	0.705	15	3.083	0.759	15
S20	Group discussion in the classroom	4.240 ~~4.231~~	0.728	19 ~~20~~	3.066	0.716	16
	Mean	4.439 ~~4.411~~	0.640 ~~0.088~~		3.232 ~~3.257~~	0.824 ~~0.165~~	

Note: SD means standard deviation

Table 3. Result of factor analysis.

No	Items	Factor 1	Factor 2	Factor 3	Factor 4
1	Course learning objectives	**0.703**	0.021	0.184	0.117
2	Course learning materials	**0.778**	0.010	0.303	0.060
3	Course learning motivation	**0.832**	0.084	0.141	0.024
5	Relevance of subject to practice	**0.686**	0.310	-0.205	0.213
6	Learning assessment methods	**0.585**	0.285	0.336	0.309
7	Electronic teaching platform	-0.171	0.176	0.037	**0.712**
8	Classroom facilities	0.310	-0.045	0.011	**0.731**
9	Availability of assistance	0.315	0.081	0.213	**0.696**
10	Wide variety of relevant courses	0.106	0.412	0.003	**0.684**
11	Students' shipping knowledge	-0.027	0.140	**0.653**	0.118
12	Students' English level	0.058	0.229	**0.677**	0.164
13	Incentives for students	0.329	0.092	**0.704**	0.017
14	Students' involvement in learning	0.353	0.339	**0.626**	-0.037
15	Students' learning strategies	0.386	0.356	**0.598**	-0.141
16	Teachers' shipping knowledge	0.021	**0.683**	0.357	0.072
17	Teachers' English level	0.167	**0.767**	0.282	0.052
18	Teachers' active encouragement	-0.035	**0.757**	0.149	0.169
19	Classroom interaction and feedback	0.100	**0.756**	0.145	0.082
20	Group discussion in the classroom	0.235	**0.619**	0.073	0.190
	Eigenvalues	6.291	2.190	1.993	1.176
	Percentage variance	33.111	11.526	10.490	6.190
	Cronbach's Alpha	0.798	0.821	0.784	0.738

Table 4. ANOVA analysis.

Factor	Group			F value	P value	Tukey and Bonferroni tests
	Group 1 (n=46)	Group 2 (n=14)	Group 3 (n=61)			
Factor 1: Course objective and content	-1.584	0.091	0.295	30.445	0.000*	(2,1), (2,3)
Factor 2: Learning resources	-0.732	0.292	1.131	39.013	0.000*	(3,1), (3,2),(2,1)
Factor 3: Students' learning characteristics	-0.481	0.049	0.081	1.872	0.158	--
Factor 4: Teachers' teaching characteristics	-0.791	-0.131	0.626	46.564	0.000*	(3,1), (2,3), (2,1)

Note: *significance level P<0.05.