

# The I-E-O-L Model and Student Survey Management - Extended the I-E-O Model and its Application

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## Abstract

This study proposes the I-E-O-L model as a new framework that adds a fourth component (L: life career) to the basic student survey I-E-O model. These four components include information that cannot be known without questioning students, for instance, their level of satisfaction with classes. Therefore, questionnaire surveys are necessary to collect this information. If surveys are conducted discretely across campus, they must be reframed and consolidated as a series of surveys collected at appropriate times as panel data based on the I-E-O-L model in order to assess and track student growth and learning outcomes. Using the I-E-O-L model, we attempted to visualize the implementation of surveys on campus, and their characteristics and problems became clear, allowing us to focus specifically on improving the efficiency and sophistication of survey operations. These findings suggest that the I-E-O-L model and its applications are useful for the management of student survey implementation.

*Keywords:* I-E-O-L model, Student growth, Panel data, Student survey management

## 1 Introduction

The I-E-O model, which provides a framework for the information needed to assess academic outcomes, was proposed by Astin [1] and further developed by researchers [2]. It is still widely referenced as a basic theory for student surveys. The model has three components: Input, Environment/Engagement, and Output/Outcome.

The information contained in I, E, and O may be stored in the university's instructional system (e.g., I: high school attended, E: major, O: grades) or may not be known until students are questioned (e.g., I: high school learning experience, E: involvement with faculty and peers, O: class satisfaction). Therefore, it is necessary to use questionnaires to survey the students.

Furthermore, a survey of graduates is required to evaluate learning outcomes [1][3]. Survey items included the utilization of learning outcomes, income, and employment status, which may have been considered part of the outcomes. However, the enrollment term is only one part of a student's lifespan, and students continue to accumulate various learning experiences after graduation. While surveys during enrollment evaluate students' growth, post-graduation surveys measure graduates' activities in society—that is, their social impact [4] or ask for another review

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and evaluation of their education at the time of enrollment, once again after their post-graduation experiences [5].

Therefore, it can be regarded as investigating a concept different from output/outcome during the enrollment period. In this study, we assumed a fourth component (L: life career) as the information to be collected in the graduate survey, and proposed the I-E-O-L model as a new framework (Figure 1).

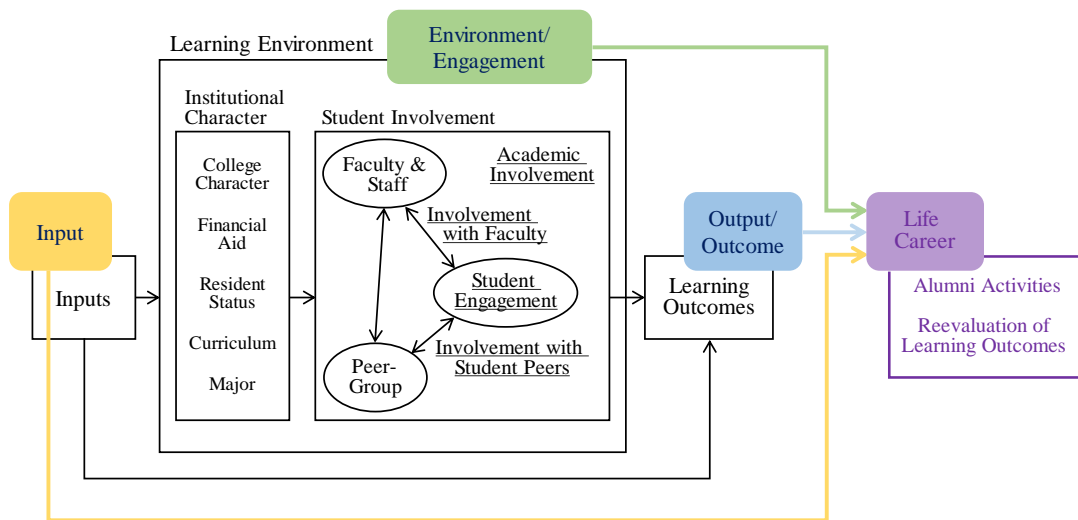


Figure 1: The proposed I-E-O-L model. The black text and figures are from Aihara [2], and the colored parts are added by the authors.

Surveys of students may be administered by a single department within the university, but in many cases, they are conducted separately in connection with each department's work. In the latter case, a department may not be aware of the surveys that another is conducting, and therefore ask similar questions at the same time, or aggregate and analyze the results of each survey.

However, to evaluate and track students' growth and academic achievements from before and after their enrollment to after graduation, it is necessary to reconsider and consolidate the separate surveys as a series of panel data collected at appropriate times, based on the I-E-O-L model. This helps improve efficiency, for example, by eliminating the duplication of question items and makes the data more sophisticated by combining it with data from other surveys and analyzing it to obtain new findings.

Anekawa [6] examined more than 70 types of student surveys conducted at Waseda University and, referring to the I-E-O model and trends at other universities, clarified problems in the university's student surveys and suggested specific ways to improve efficiency and sophistication. In addition, she developed enrollment management in the university's decentralized IR system (EMIR) and encouraged each of the relevant departments to take charge of practical operations from data collection to analysis, resulting in more efficient and sophisticated IR activities for the university as a whole [7].

In this study, we first collected information on actual student surveys conducted on campus and then attempted to organize this information using the I-E-O-L model to

obtain an overall picture and identify problem areas, which proved to be effective. As this is believed to be conducive to student survey management, the following is reported.

## 2 Methods

To organize information about the on-campus surveys, our goal was to create a single sheet that would provide a complete overview. First, we listed the contents of each survey, that is, the components of the I-E-O-L model and other information (Table 1).

Table 1: List of student surveys on campus using the I-E-O-L model.

Timing	Department	Main Theme	Collection Method	Individual Identification	Student Grade Level										I-E-O-L model				
					Applicant	B1	B2	B3	B4	M1	M2	D1	D2	D3	Alumni	Input	Environment/Engagement	Output/Outcome	Life Career
Application	Admissions	Motivation for Applying	Online	Impossible	△												▲		
Orientation	Student Support	Adaptation to New Environment	Online	Possible		△					△		△				▲	▲	
Enrollment Term	Faculty Development	Class Evaluation	Online	Impossible		△	△	△	△	△	△	△	△	△				●	●
	International Exchange	Study Abroad Procedures	Online	Possible		○	○	○	○	○	○	○	○	○				●	●
Prior to Graduation or Completion	Educational Affairs	Sense of Growth and Accomplishment	Online	Possible						△		△			△		▲	●	●
	Career Support	Job Searching Process	Online	Possible						△		△			△			●	●
	Student Support	Career Paths	Online	Possible						◎		◎			◎			▲	●
After Graduation or Completion	Educational Affairs	Reevaluation of Learning Outcomes	Online	Impossible											△				●
	Diversity Promotion	Alumni's Life Career	Online	Impossible											△				●

◎: Required, ○: As Needed, △: Voluntary, ●: Sufficient questions, ▲: Insufficient questions

This consolidates information on all campus surveys into a single sheet. While the information on one survey is presented on a single horizontal line; the timing of the survey in the first column and the target grades in columns 6–16, although related, are scattered. These factors make it difficult to grasp the overall picture of campus surveys.

The next step was to create a matrix with the components of the I-E-O-L model in the rows and items in the columns, along with a set of survey timings and target grades, also based on Anegawa [6]. A card was created for each survey containing the following six pieces of information: 1) department, 2) main theme, 3) number of questions, 4) required or voluntary, 5) collection method, and 6) individual identification.

Finally, the survey cards were mapped to the position where the timing of the survey crossed the I-E-O-L component, which was the main theme of each survey. Note that the timing of the survey and the I-E-O-L component do not necessarily correspond individually. For example, a

survey of first-year students with questions on both I and E was placed so that the cards spanned both components.

### 3 Results and Discussion

Figure 2 illustrates a sheet that reorganizes the information from the on-campus surveys based on the reflections in Table 1. This is another sheet that consolidates information on the entire intramural survey into a single sheet. However, compared to Table 1, it is visualized such that the focus elements of each survey and time of the year is visible at a glance. From the observations in Figure 2, the characteristics of the implementation of the surveys on campus can be summarized as follows.

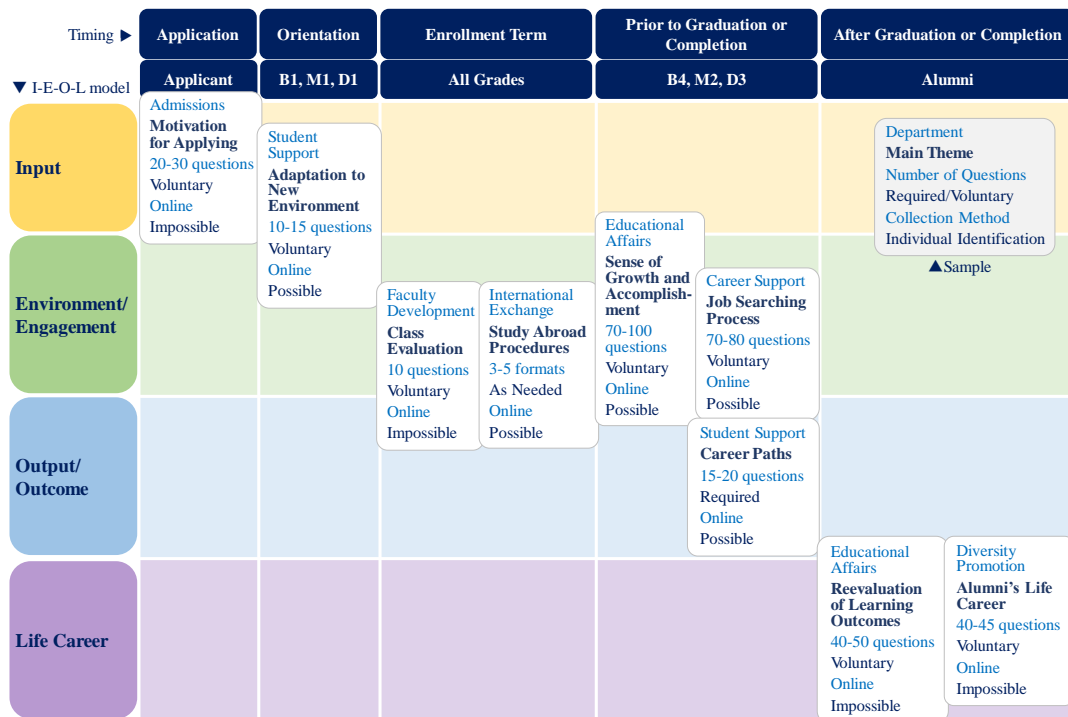


Figure 2: Matrix mapped student surveys on campus using the I-E-O-L model.

- Nine surveys were conducted on campus and mapped from the top left to bottom right of the matrix.
- The departments responsible for these surveys are disparate. In addition, the tabulation and analysis remained within the survey.
- Currently, all surveys are online, but some cannot be linked to individuals.
- Three surveys were administered before graduation; two were administered to graduates, and there appeared to be some overlap in the questions.
- Two of the three pre-completion surveys had a particularly large number of questions, which may be burdensome for the respondents.
- Two of the three surveys for graduates were conducted by two different departments, and there is a possibility that the timing of the surveys may overlap.

- Overall, the four components of the I-E-O-L model were surveyed in one step; however, the collection of pre-admission information may not have been sufficient, because questions were not asked about whether the student was admitted as a first choice or about the student's study experience in high school.

We use Figures 1 and 2 to consolidate surveys administered to students in disparate parts of the university. Based on past efforts, it is believed that the I-E-O-L model (Figure 1) and the matrix (Figure 2) that uses it to visualize survey implementation will facilitate a common understanding among the parties involved in the following: 1) student surveys need to be designed based on the I-E-O-L model, 2) what grades are being surveyed, what surveys are being conducted, and by what departments; that is, each survey is always primarily responsible for one component of the I-E-O-L model.

Once this common understanding is reached, we can suggest ways to streamline and upgrade the surveys. As suggested by Anegawa [6][7], this refers to streamlining the questionnaire by consolidating duplicate questions. Survey sophistication can be achieved by collecting panel data through Individual Identification and combining it with other surveys for analysis.

If the above efforts are promoted sequentially within the university to reduce the burden on students who respond to the survey and improve the efficiency of the survey process, we can move closer to an ideal student survey, in which the necessary information is collected as panel data at the appropriate time. In addition, if it becomes possible to track students' growth and learning outcomes before and after enrollment to after they graduate, and gain new insights by combining and analyzing multiple surveys, then effective proposals may be made to help universities solve problems and improve the quality of education.

## **4 Conclusion**

In the management of student survey implementation, the I-E-O-L model, a new framework of information necessary to evaluate student growth and learning outcomes, is effective in promoting a common understanding among the parties involved as a basic theory of student surveys. The matrix that uses it to visualize survey implementation is a useful tool to intuitively grasp the overall picture.

However, these are proposed as effective methods in the early stages of the management of student survey implementation, that is, in consensus-building among the parties involved. Methods to increase efficiency and sophistication, such as detecting and consolidating overlaps in multiple survey questions, as well as combining multiple surveys, and analyzing them for new findings, will need to be explored separately.

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