

Consistency of the I-E-O-L Model and the Guidelines for Academic Management - Revisiting the Extended I-E-O Model for Student Survey Management -

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Abstract

The *Guidelines for Academic Management* (henceforth referred to as the Guidelines) issued by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) require Japanese universities to foster autonomy in learners and university management. As such, one of the expected management processes is to establish institutional research (IR) on teaching and learning to grasp and visualize academic and educational outcomes. However, in many cases, the student surveys used to collect information for this purpose are conducted in a disjointed manner based on the business needs of each administrative department of the university, unrelated to IR. In those cases, data tabulation and analysis are completed within each survey, and it is, therefore, expected that the data is not fully utilized as panel data. In our IR practice, we utilize the I-E-O-L model, an extended version of the I-E-O model, to clarify issues and enhance the efficiency and sophistication of such student surveys. However, in this process, there have been instances where the cooperation of the various administrative departments was not forthcoming. Consequently, it is necessary to ascertain the consistencies between the I-E-O-L model and the Guidelines and to evaluate the efficacy of utilizing them as a foundation for IR staff to be engaged in student surveys sponsored by each administrative department and to seek collaboration.

Keywords: I-E-O-L model, Student survey management, Institutional Research, Guidelines for Academic Management

1 Introduction

Over the past several years, the Subcommittee on Universities of the Central Council for Education [1][2] of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) has compiled and published the *Guidelines for Academic Management* (henceforth referred to as the Guidelines) and its addenda, which set forth the policies for university administration required in the unpredictable future. To allow universities to respond flexibly to any situation, the Guidelines call for universities to foster autonomy in their learners as well as their operations in order to achieve their educational goals.

The Guidelines stipulate that it is vital to establish and advance institutional research (IR) on teaching and learning as one of the foundations to support university management and that, to achieve this, it is essential to understand and visualize academic and educational outcomes

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through surveys at the university-wide, degree program, and coursework levels, providing students with an awareness of their learning outcomes and enabling universities to review and improve their education. The report also presents the concept of the significance, contents, and methods of grasping and visualizing information on academic and educational outcomes, as well as some specific examples of such information.

The I-E-O model, proposed by Astin [3][4], is a well-known framework for evaluating academic and educational outcomes. This model, named after the initial letters of the three components input, environment, and output, is still widely referred to as a basic theory for conducting student surveys and has been further developed by numerous researchers. In Japan, for instance, there are two notable models: the I-E-E-O model by Yamada [5] and the comprehensive I-E-O model by Aihara [6], which consider the elements of student engagement. The latter model, in particular, posits that the learning environment encompasses not only institutional characteristics but also students' proactive involvement, including their relationships with their surroundings.

2 The I-E-O-L Model and Issues in its Application

Having developed Aihara’s model [6], we propose the I-E-O-L model [7], in which life career is considered as a fourth component—the information on which is obtained from a questionnaire survey of graduates. While post-graduation information is included in the output/outcome component in the traditional model, it was considered necessary to take into account the added effects of post-graduation experiences when using it to explain academic and educational outcomes. Thus, to make this explicit, we decided to treat post-graduation information as a fourth component, 'L', which is independent of 'O'. Given that the collection of information on 'L' will target graduates, i.e., those who are not currently affiliated with a university, it will be more compatible with the operational aspects of the survey. In light of these considerations, we have revised the image of the I-E-O-L model, as shown in Figure 1.

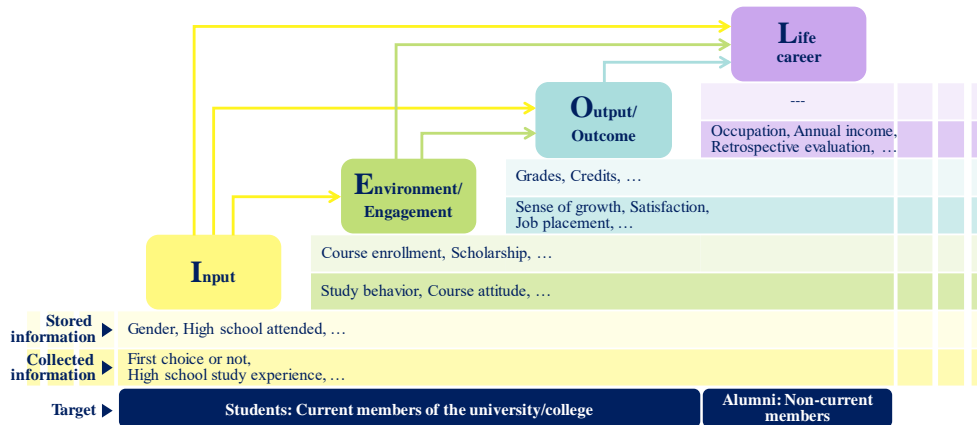


Figure 1: Revised image of the I-E-O-L model. The I, E, O, and L elements are presented in a layered format along the time axis, from left to right in the figure. The upper portion of the layer displays the data stored at the university/college, while the lower portion of the layer presents the data collected in the survey. The lowermost layer of the figure depicts the target population of the student survey.

We also used the I-E-O-L model to visualize the implementation of the various student surveys (Figure 2) [7]. This visualization allows administrators to quickly understand the timing and

scope of the surveys on campus and to intuitively grasp their overall picture, promoting a common understanding among all those involved of the importance of basing the design on the I-E-O-L model, and which departments are involved in conducting the survey for which grades and for which elements (I, E, O, L).

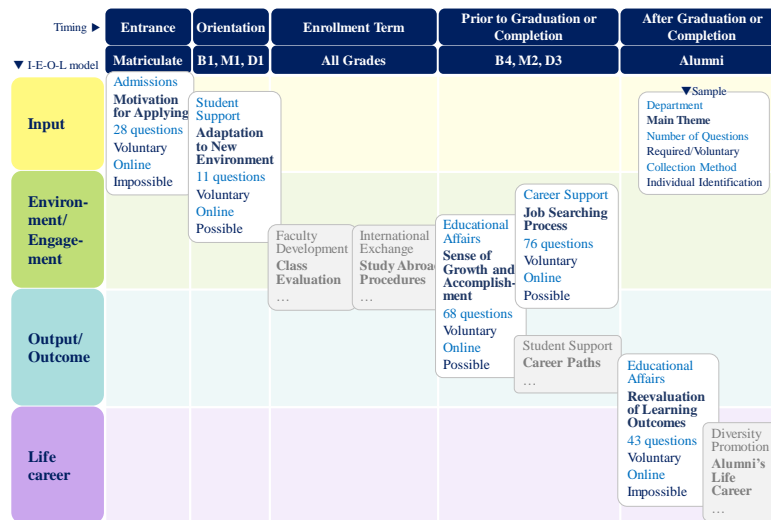


Figure 2: Example of mapping of student surveys of under graduate students using the I-E-O-L model [7]. It should be noted that surveys involving advanced IR involvement are indicated in blue text, while those that do not are grayed out.

In many cases, student surveys in Japan are conducted in a disjointed manner, with each survey planned and conducted based on the business needs of each administrative department of the university, independently of IR [8][9]. If the objectives of the administrative department that conducts the survey and those of IR do not align, the information provided by the I-E-O-L model alone may not be sufficient to create the above-mentioned common understanding among the parties involved, and cooperation in IR activities may not be forthcoming.

Nevertheless, despite the apparent incompatibility of the objectives of the two parties, if both initiatives contribute to university management, for instance, by demonstrating that the I-E-O-L model is highly consistent with the guidelines set forth by MEXT, it may be understood that the involvement of IR is largely due to external pressure, possibly prompting a compromise from the other party. This study thus examines the consistency of the I-E-O-L model with the Guidelines presented by MEXT, which is responsible for higher education policy in Japan. It also considers the potential for utilizing the results to promote the necessity of stakeholders to collaborate toward designing student surveys in accordance with the I-E-O-L model. The viability of this approach will be discussed.

3 Consistency between Guidelines and I-E-O-L Model

At the beginning of Chapter 3 of the Guidelines, entitled "Understanding and Visualizing Academic and Educational Outcomes," the following statements are made: (1) It is essential for both students and the university to have an accurate understanding and visualization of their academic and educational goals. This enables them to be aware of their current achievement status and to strive for improvement, maintenance, and enhancement. (2) It is necessary to integrate multiple

pieces of information in a multidimensional manner, recognizing that there are inherent limitations in understanding and visualization.

In his work, Astin [3] asserts that monitoring student growth using the I-E-O model and returning the results in an appropriate form to each student and university is crucial for achieving their respective goals, and the I-E-O-L model, an extension of Astin's model, builds upon this idea, which is also consistent with statement (1).

Furthermore, Astin notes that student development is influenced by both the university and external factors such as maturation and the extracurricular environment. Therefore, when evaluating academic and educational outcomes, it is essential to consider not only output/outcome information but also multiple inputs and environmental/engagement factors that may influence the outcome. The I-E-O-L model also adheres to this perspective and is in alignment with the aforementioned statement (2).

Chapter 3 of the Guidelines classifies the information to be collected into the following two categories and provides some specific examples: (a) basic information associated with the educational activities of a university, which is considered collectible by all universities, and (b) information that is expected to be collected at the discretion of each university in establishing academic management.

Table 1 presents illustrative examples of this information, classified according to the I-E-O-L model. However, the specific data required to evaluate the components of environment/engagement and life career may vary depending on the educational content of each university.

Table 1: Examples of Information Collected for Understanding and Visualizing Learning Outcomes/Educational Achievements from Guidelines [1][2].

I-E-O-L Model	(a) Basic information related to university educational activities, which is expected to be collectible at all universities	(b) Information expected to be collected under each university's discretion for establishing academic management
Input	<ul style="list-style-type: none"> Tracking survey of methods used for university admissions selection (grades, activity records, rates of repeating a year or dropping out) Factors such as age, gender, disability, nationality, family background, and residential area 	—
Environment/Engagement	<ul style="list-style-type: none"> Achievement status of learning objectives in each course subject. Study hours* 	<ul style="list-style-type: none"> Direct assessment of achievement status in course subjects that can evaluate specific qualities and capabilities defined in the "graduation certification and degree conferral policy." Results of assessment tests Scores from external examinations such as language proficiency tests* Status of qualifications acquired, awards, and recognitions*
Output/Outcome	<ul style="list-style-type: none"> Degree acquisition status Students' sense of growth and satisfaction Post-graduation status such as progression rates to further education or employment Proportion of students graduating within the scheduled period, rates of repeating a year, and dropout rates 	<ul style="list-style-type: none"> Standard of graduation thesis or research
Life career	—	<ul style="list-style-type: none"> Evaluation of graduates Graduates' evaluations of the university*

* Data collected through surveys and interviews targeting students and graduates

The evaluation of academic and educational outcomes using post-graduation information, or life career, is as follows. Time spent at a university is only one aspect of a person's life; students gather learning experiences before entering university and continue to accumulate new ones post-graduation. As Astin noted above, students also learn from their experiences outside of college.

While university education may indeed exert a significant influence on graduates' outcomes, post-graduation information introduces an additional factor that is not accounted for in the university's assessment: the post-graduation experience. Thus, in evaluating academic and educational outcomes, it is likely that greater attention will be required when collecting and analyzing information for L than for the I, E, and O components that can be collected during the school year.

With regard to post-graduation, this may be one of the limitations of the study that both the Guidelines and Astin point out. These guidelines classify post-graduation information under category (b) above, leaving it up to each university to decide what information to collect while Astin's study [3] focuses on outcomes that can be observed while students are still at university. Future research on the evaluation of academic and educational outcomes for post-graduation is awaited.

At this juncture, the design of the student survey in accordance with the I-E-O-L model is deemed to align with the Guidelines, largely due to its inherent characteristics. These include its suitability for monitoring student growth and its commitment to conducting a multidimensional evaluation based on multiple pieces of information, while acknowledging the limitations of the evaluation of the components, including L.

4 Effectiveness in Promoting Cooperation among Stakeholders

It is challenging to systematically redesign a series of student surveys that have previously been conducted in a piecemeal fashion with no clear connection to IR. Moreover, as the surveys have been designed based on the needs of each administrative department and their results are utilized to a certain extent, universities may become increasingly reluctant to alter their content and methodology unless there are significant drawbacks [10].

However, the current approach to conducting surveys is fragmented, resulting in fatigue among students and faculty. The Guidelines recommend coordination among departments when conducting surveys to enhance efficiency and sophistication, recognizing that time is finite for all stakeholders. Reception to this approach may be greater if universities are made aware that it is not only the opinion of IR staff but also a guideline of a higher education policy, i.e., a request from the national government.

5 Conclusion

The objective of this study was to ascertain the congruence between the I-E-O-L model, an augmented version of the I-E-O model, and the *Guidelines for Academic Management* by the Ministry of Education, Culture, Sports, Science, and Technology (MEXT). Additionally, the study aimed to propose a methodology for coordinating the activities of the various stakeholders. However, there are still outstanding issues regarding post-graduation evaluation that demand further research.

We have proposed the I-E-O-L model for the management of student surveys and have used it to develop a matrix to visualize the implementation of disparate surveys and to form a common understanding. Although some issues remain, we believe that the results of this study will be

utilized in the practice of student survey management and will facilitate future practice.

Acknowledgement

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References

- [1] Subcommittee on Universities, Central Council for Education, “Kyogaku Management Shishin [Guidelines for Academic Management],” 2020. https://www.mext.go.jp/b_menu/shingi/chukyo/chukyo0/toushin/1411360_00001.html (accessed Apr. 15, 2024).
- [2] Subcommittee on Universities, Central Council for Education, “Kyogaku Management Shishin (Tsuiho) [Supplement to the Guidelines for Academic Management],” 2023. https://www.mext.go.jp/content/20230228-mxt_daigakuc01-000004749_1.pdf (accessed Apr. 15, 2024).
- [3] A. W. Astin, *What matters in college?: four critical years revisited*. San Francisco, CA: Jossey-Bass, 1993.
- [4] A. W. Astin, *Assessment for Excellence: The Philosophy and Practice of Assessment and Evaluation in Higher Education*. Phoenix, Arz.: Oryx Press, 1993.
- [5] T. Yamada, “Manabi to Seichoh wo Unagasu Assessment Design [Assessment Design to Promote Learning and Growth],” *Between*, no. Oct-Nov, pp. 32–34, 2013. https://www.shinken-ad.co.jp/between/backnumber/pdf/2013_10_assessment.pdf (accessed Apr. 15, 2024).
- [6] S. Aihara, “Development of Comprehensive I-E-O Model Incorporating Alternative Engagement: How to Measure Learning Outcomes of Japanese College Students,” in *2012 IIAI International Conference on Advanced Applied Informatics*, IEEE, Sep. 2012, pp. 303–308. doi: 10.1109/IIAI-AAI.2012.66.
- [7] Author 1, Author 2, Author 3, Author 4, K. Anegawa, Author 5, M.A. Arbib, ed., *The Handbook of Brain Theory and Neural Networks*, MIT Press, 1998. S. Matsumoto, K. Takamatsu, S. Imai, T. Inakura, K. Anegawa, and M. Mori, “The I-E-O-L Model and Student Survey Management,” *IIAI Lett. Institutional Res.*, vol. 3 (LIR135), pp. 1–6, 2023, doi: 10.52731/lir.v003.135.
- [8] K. Anegawa, “Benchmarking as a Method for Analyzing Issues in the Waseda University Student Survey,” *Waseda Rev. Educ.*, vol. 31, no. 1, pp. 73–83, 2017. https://waseda.repo.nii.ac.jp/record/36493/files/WasedaKyoikuHyon_31_1_Anegawa.pdf (accessed Apr. 15, 2024).
- [9] K. Anegawa, “Waseda daigaku ni okeru enrollment management no tenkai [Development of enrolment management at Waseda University],” *IDE*, no. 598, pp. 60–64, 2018.
- [10] W. Samuelson and R. Zeckhauser, “Status quo bias in decision making,” *J. Risk Uncertain.*, vol. 1, no. 1, pp. 7–59, Mar. 1988, doi: 10.1007/BF00055564.