Factors that Associate with the Selection of Instructional Strategies in Information Systems Discipline

Yenni Merlin Djajalaksana*, Robert F. Dedrick **, James A. Eison ***
* Information Systems Program, Faculty of Information Technology, Maranatha Christian University
**Educational Measurement and Research Department, University of South Florida
*** Adult, Career, and Higher Education Department, University of South Florida

Keywords:

Selection of Strategies
Teaching Methods
Instructional Strategy
Multiple Regression Analysis

ABSTRACT

Information Systems is a discipline which connects the concepts, theories, and processes between business world and information technology systems. Teaching information systems subjects present different challenges, as faculty members need to use strategies that can blend the subjects well. Limited research had investigated a number of factors which relate to the selection of instructional or teaching strategies to be used in a face-to-face classroom, outside of the classroom, or in an online learning environment. This study investigated whether gender, rank, age, course level, delivery format, class size, years of prior teaching experience, and availability of teaching assistants are among the factors that relate to the selection of instructional strategies within this discipline. A web-based survey questionnaire was distributed to members of the Association of Information Systems who were teaching in the United States institutions. There were 695 valid responses (24.4% response rate) obtained from 2,835 valid participants. A multiple regression analyses were performed against the top 9 strategies that were frequently used by information systems faculty. The results suggested that not all factors were influential. Depending on which strategies, only six factors had significant influences on the selection of instructional strategies or group of instructional strategies.

Corresponding Author:

Yenni Merlin Djajalaksana,
Information Systems Program, Faculty of Information Technology,
Maranatha Christian University,
Jl. Suria Sumantri No. 65, Bandung, Indonesia
E-mail : yenni.md@fulbrightmail.org

1. INTRODUCTION

It is common for higher education students to find instructors who cannot really teach. Among the many reasons, it was because the instructors never really received any pedagogical training after they graduated from the graduate schools. Mostly they taught in the colleges or universities right after graduation. Although these graduates are experts in their field, it does not mean that they are ready to teach immediately after their subject. Among the many decisions that they must make, a new instructor should select instructional strategies that are appropriate for their course. The one logical reason behind this was that faculty members often chose lecture method blindly instead of other more appropriate or powerful instructional strategies. This was often the result of faculty's dependence on the lecture method to cover their lack of pedagogical content knowledge [1], [2].

Although it is known that lectures are widely used in almost the majority of disciplines, it is interesting to investigate the factors which influence the selection of instructional strategies. Similar to what happened in other disciplines, the lecture remains the most frequently used strategies in the information systems discipline [3]. The information systems discipline is the one that connects the concepts, theories, and processes of the business world and of the information technology. Thus, this discipline is very diverse, and it presents its own challenge to be able to determine the kinds of strategies that should be used in teaching information systems courses.

This study attempted to investigate the factors which may affect the selection of instructional strategies. Similar studies which investigated the factors in selecting teaching strategies were somewhat

limited. These limited ones, were also normally done as a part of larger studies. For example, there are studies which discuss the factors that influence the selection of teaching methods by focusing only on one factor, such as teaching in large classes [4], or gender influence [5]. There were few studies which focused on identifying the factors which influence the selection of teaching strategies.

In Lammers and Murphy's study [1] for example, as part of the investigation of active learning strategies used in the classroom, they identified that few factors differentiated the strategy selections: gender (male vs. female), class size, and class meeting time. This study was an observational study involving 48 instructors teaching 58 different undergraduate classes across 19 different disciplines in the university level. In their study, it was identified that more male instructors used lecture method than female instructors, the larger class size was related to the use of more lecture, and the longer class meeting time was related to the selection of more active learning strategies.

Another study by Csapo and Wilson [2] was the closest to the focus of the current study. They investigated the factors that affect preferences of faculty members in selecting certain teaching methods. This study uncovered the responses from a total of 89 faculty-member participants in three different universities. Their study identified that the selection of teaching methods were influenced by the subject matter, class size, and the amount of material to be covered in the course. The participants identified that the selection of teaching methods was mostly influenced by the subject matters. In addition, the larger class size and the amount of material covered were also identified as the factors influencing the selection. Interestingly, there were very few which mentioned that their selection of teaching methods was influenced by what students are interested in.

This study attempted to investigate whether selected demographic factors (i.e., gender, rank, age, and years of teaching experience), and course characteristics (i.e., course level, delivery format, class size, and availability of student assistants) are associated with the instructional strategies selected by information systems faculty.

2. RESEARCH METHOD

This is a quantitative, exploratory study with survey method employed in the data collection, followed by a multiple regression analysis. The data were collected using online survey with a web-based survey tool, which link was distributed by e-mail to invite participation. The population surveyed was the information systems faculty who were listed in the Association of Information Systems membership in 2010 available online. A questionnaire was developed by an expert team in reference to the instrument construction process of Crocker and Algina [10]. A face validation was performed by a number of expert reviewers. The web-based questionnaire asked for demographic (gender, rank, age, years of prior teaching experience) and course characteristics (course level, delivery format, class size, and availability of teaching assistants) of participants. All courses investigated in this study are information systems courses that were taught in the information systems discipline as the initial question had screened that only faculty members teaching IS courses can proceed to the subsequent questions. In addition, it listed 52 instructional strategies which were composed of: 22 in-class activities, 10 online activities, and 20 assignments. A Likert-type scale from Never, Rarely, Occasionally, Frequently/Almost Always, and Always were measuring the frequency of the instructional strategy use. Three reminder e-mails were delivered after the initial invitation e-mail. There were 695 valid responses collected or 24.4% response rate based on 2,853 valid potential participants. Nine strategies were identified as the most frequently used in the discipline. A multiple regression analyses for the nine top strategies were performed to measure whether the demographic and course characteristics influenced the selection of instructional strategies.

3. RESULTS AND ANALYSIS

3.1. Participant Profile

Participants were mostly male (n=477, 68.6%), with the current rank as associate professors (31.7%) or assistant professors (26.9%). The majority participants were at age of 48.8 years (SD=10.8), and had taught for average of 8.7 years (range= 0 to 45). They taught in the intermediate/advanced graduate course (39.9%), graduate course (31.2%), and undergraduate course (28.6%). The face-to-face only (63.7%) was the major delivery method used, and the rest were hybrid (24.3%) and online only (5.5%). Those who used teaching assistants in their teaching were only 24.3% of the participants.

3.2. Research Design and Analysis

The multiple regression method was employed to analyze the factors which associated with the selection of instructional strategies. The use of multiple regression method was intended to minimize type I error. Nine multiple regression models were developed with the independent variables remain the same, i.e. the demographic factors (i.e., gender, rank, age, and years of teaching experience), and course characteristics

(i.e., course level, delivery format, class size, and availability of student assistants). The dependent variables were the means frequency of use from each of the nine instructional strategies. The nine top instructional strategies were lecture, interactive lecture, lab activities, case study, analysis and design projects, whole group discussions, cooperative-learning/team-based learning, problem-based learning, and demonstrations (as shown in Table 1). The selection of these 9 strategies to be the independent variables were based on the logic that these nine strategies were used the most by the information systems faculty members. The *b* constants, standard deviations, and *betas* were collected for each model, and then the measures of significance were collected through inferential statistics (*F-scores*), and *coefficient of determination* (R^2). Three different significance levels (* $p<.05$, ** $p<.01$, *** $p<.001$) were used to examine the significance of *b* and *betas*.

3.3. Factors Associated with Selection of Strategies

The results revealed that not all factors examined in this study were uniformly significant for one specific instructional strategy. There were seven of eight factors that had significant associations with the selection of strategies:

1. Gender was significant for the use of lecture, interactive lecture, and whole group discussion, but not the other six strategies.
2. Faculty rank was a significant predictor for the use of case study, analysis and design projects, and whole group discussion, but not the others.
3. Age was significant for the use of lecture and whole-group discussion only.
4. Course level was associated with all of the most frequently used instructional strategies except the demonstrations strategy.
5. Delivery format was significant for the use of lecture and interactive lecture, but not the rest seven strategies.
6. Class size was significant predictor for case study, analysis and design project, problem-based learning, and demonstration, but not the rest four.
7. The availability of teaching assistants was a significant predictor for the use of interactive lecture, but not other strategies.

The one factor left, the experience was not significantly associated with the selection of strategies in the information systems discipline. None of its *b* or *beta* was statistically significant at 0.05 significance level.

The next phenomenon to be examined will be the tendency of more or less use of specific strategies based on these significant factors. Based on the multiple regression models, the following tendencies existed. Only those with significant b or betas are stated below:

1. Females were significantly more likely to use the instructional strategies within the in-class active learning cluster, interactive lecture, and whole group discussions.
2. Faculty in the lower academic rank tend to use case study, analysis and design project, whole-group discussion in comparison to the faculty in the higher academic rank.
3. Younger faculties tended to use lecture strategy than the older faculties, but older faculties tended to use whole-group discussions more than the younger faculties.
4. Lecture and lab activities were used less at the lower course level, while the other instructional strategies (case study, analysis and design project, whole-group discussion, cooperative/team-based learning, and problem-based learning were used more frequently at the upper course level.
5. Lecture and interactive lecture were less used in an online only course in comparisons to the face-to-face only and hybrid courses. Lab activities were used more in the hybrid course in comparisons to the online only and face-to-face only courses.
6. Larger class size tended to use more of case study strategy, and tended to use less of analysis and design project, problem-based learning, and demonstrations.

Table 1. Predictors of Instructional Strategy Selection

Predictor	Dependent Variables: Lecture			Interactive Lecture			Lab Activities			Case Study			Analysis and Design Project		
	b	*SE (b)*	*β*	*B*	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
(Constant)	3.85***	0.33		2.87***	0.32		3.42***	0.40		0.47	0.37		2.14***	0.49	
Gender[a]	-0.24*	0.10	-0.09*	0.29**	0.10	0.12**	0.10	0.12	0.03	0.20	0.11	0.07	0.14	0.15	0.04
Faculty Rank[b]	-0.06	0.05	-0.06	-0.03	0.04	-0.03	-0.02	0.06	-0.02	-0.16**	0.05	-0.14**	-0.15*	0.07	-0.10*
Age	-0.01*	0.01	-0.10*	-0.01	0.00	-0.08	0.00	0.01	-0.03	0.01	0.01	0.08	0.01	0.01	0.04
Experience	0.00	0.01	0.01	0.01	0.01	0.04	0.01	0.01	0.03	0.01	0.01	0.05	0.02	0.01	0.07
Course Level[c]	-0.14*	0.06	-0.09*	0.14*	0.06	0.10*	-0.46***	0.08	-0.27***	0.59***	0.07	0.35***	0.26**	0.09	0.12**
Online Only[d]	-1.12***	0.20	-0.23***	-0.83***	0.19	-0.18***	-0.09	0.24	-0.02	-0.15	0.22	-0.03	-0.46	0.30	-0.06
Hybrid Format[e]	0.00	0.11	0.00	0.20	0.10	0.08	0.31*	0.13	0.10*	-0.01	0.12	0.00	-0.08	0.16	-0.02
Class Size[f]	0.02	0.06	0.01	0.00	0.05	0.00	-0.09	0.07	-0.06	0.13*	0.06	0.09*	-0.28**	0.08	-0.15**
TA Availability[g]	-0.03	0.11	-0.01	-0.26*	0.11	-0.10*	0.03	0.13	0.01	0.19	0.12	0.06	-0.02	0.17	-0.01
R^2	.09			.08			.08			.15			.06		
F	6.42***			5.63***			5.03***			10.38***			3.95***		

Predictor	Dependent Variables: Whole Group Discussion			Cooperative Learning/Team-Based Learning			Problem-Based Learning			Demonstrations		
	b	*SE (b)*	*β*	*b*	*SE (b)*	*β*	*B*	*SE (b)*	*β*	*b*	*SE (b)*	*β*
(Constant)	1.09**	0.32		1.73***	0.35		1.97***	0.37		3.12***	0.35	
Gender[a]	0.37***	0.10	0.15***	0.07	0.11	0.03	0.16	0.11	0.06	0.12	0.11	0.05
Faculty Rank[b]	-0.09*	0.04	-0.09*	-0.09	0.05	-0.08	0.01	0.05	0.01	-0.02	0.05	-0.02
Age	0.01*	0.00	0.10*	0.01	0.01	0.07	0.01	0.01	0.07	-0.01	0.01	-0.06
Experience	-0.01	0.01	-0.06	-0.01	0.01	-0.03	0.00	0.01	0.00	0.01	0.01	0.06
Course Level[c]	0.42***	0.06	0.29***	0.36***	0.07	0.23***	0.21**	0.07	0.13**	-0.12	0.07	-0.08
Online Only[d]	0.15	0.20	0.03	-0.26	0.21	-0.05	-0.20	0.22	-0.04	-0.10	0.21	-0.02
Hybrid Format[e]	-0.04	0.10	-0.01	0.07	0.11	0.02	0.15	0.12	0.05	0.25	0.11	0.09
Class Size[f]	-0.01	0.05	0.00	-0.04	0.06	-0.03	-0.15*	0.06	-0.11*	-0.12*	0.06	-0.10*
TA Availability[g]	0.06	0.11	0.02	-0.11	0.12	-0.04	-0.14	0.12	-0.05	-0.04	0.12	-0.02
R^2	.12			0.07			0.05			0.03		
F	8.69***			4.60***			3.42**			1.67		

Note. *n*=695. * *p*<.05, ** *p*<.01, *** *p*<.001

[a]Gender was coded 0 for male and 1 for female

[b]Faculty rank was coded for 1 for instructor/lecturer, 2 for assistant professor, 3 for associate professor, and 4 for full professor.

[c]Course level was coded 1 for introductory undergraduate course, 2 for intermediate/advance undergraduate course, and 3 for graduate course.

[d]This is a dummy variable created for delivery format, in reference to the face-to-face course format. The face-to-face is coded 0 and the online only is coded 1.

[e]Online only and hybrid format are both dummy variables created for delivery format, in reference to the face-to-face course format. The face-to-face was coded 0 and each the online only and the hybrid format was coded 1 accordingly.

[f]Class size was coded 1 to 6 starting from 1 for 1-14 students, to 6 for 200 or more students.

[g]TA availability was coded 0 for not available and 1 for available.

7. When teaching assistants were available, the faculty members tended to use less of interactive lectures.

3.4. Research Validity

These phenomenons are certainly worth the observation. Although further investigation are needed to identify more factors which influence the selection of strategies, this research can provide a preview on what factors are significant. There are a few weaknesses that must be acknowledged:

1. The coefficients of determination (R^2) were considerably low, which only ranged from 0.03 to 0.15. This means that only 3% to 15% variations in the models are explained by the eight factors. Although the R^2's are low, the models are highly significant, except for the Demonstrations strategy. Thus, further study should be conducted to add more factors into the models. Examples of other factors that can potentially be added to improve the R^2 are ethnicity, prior teacher training experience, class meeting duration, class meeting time, course classification, and institution type. There might be more potential factors to build better models, and further investigation should be performed to confirm the hypothesis.
2. The population of information systems faculty is somewhat limited to those who are members of the Association of Information Systems. Although the size of the sample is large, the results may not be generalizable to a wider audience.

4. CONCLUSION

This research managed to collect evidence that gender, rank, age, course level, delivery format, class size, and availability of teaching assistants were significant factors associated with the selection of instructional strategies in the information systems discipline. Only years of teaching experience was not found to be significant. The years of teaching experience may not be significant due to the fact that new faculty members who started as a new instructor can polish their teaching skills by joining teaching workshops in their institutions. Such treatments are common in many US institutions as evidenced by the existence of their faculty development center or teaching workshops provided for the new instructors. Thus, this finding was somewhat predicted and can be logically reasoned. Future studies can investigate more factors which associated with the selection of instructional strategies in the information systems discipline as well as other disciplines. In addition, the Association of Information Systems curriculum should be used as a reference in classifying the types of course being investigated.

ACKNOWLEDGEMENTS

The survey instrument employed in this study was a result of wonderful team work at University of South Florida. The team consists of Yenni M. Djajalaksana (Instructional Development Scholar); James A. Eison (Professor of Higher Education); Karla Davis-Salazar (Associate Professor; Director, USF Global Citizenship Program; Chair and Coordinator, USF General Education); Robert F. Dedrick (Professor of Educational Measurement and Research). We also would like to acknowledge our survey instrument reviewers: Barbara Millis (Director of the Teaching, Excellence, Advancement and Mentoring (TEAM) Center, University of Texas at San Antonio), Dee Fink (Professional Consultant in Higher Education, Fink and Associates), Grandon T. Gill (Associate Professor in Information Systems and Decision Support), and Yi-Hsin Chen (Assistant Professor in Measurement and Research)

REFERENCES

[1] C. C. Bonwell and J. A. Eison, Active learning: Creating excitement in the classroom, Washington, DC: The George Washington University, School of Education and Human Development, 1991.

[2] L. S. Shulman, "Knowledge and teaching: Foundations of the new reform.," *Harvard Educational Review,* vol. 57, 1987.

[3] Y. M. Djajalaksana, "A national survey of instructional strategies used to teach information systems courses: An exploratory investigation," 2011.

[4] C. Mulryan-Kyne, "Teaching large classes at college and university level: challenges and opportunities," *Teaching in Higher Education,* vol. 15, no. 2, pp. 175-185, 2010.

[5] W. Thielens Jr., "The disciplines and undergraduate lecturing," in *American Educational Research Association,* Washington, DC., 1987.

[6] W. J. Lammers and J. J. Murphy, "A profile of teaching techniques used in the university classroom: A descriptive profile of a US public university," *Active Learning in Higher Education,* vol. 3, no. 1, pp. 54-67, 2002.

[7] N. Csapo and H. Wilson, "A study of business faculty preferences for teaching methods used and why," *Issues in Information Systems,* vol. II, pp. 64-70, 2001.

BIBLIOGRAPHY OF AUTHORS

Yenni M. Djajalaksana is a Faculty in the Information Systems program at Maranatha Christian University, Indonesia. She was a Fulbright scholar and worked as an Instructional Development Scholar at the Academy for Teaching and Learning Excellence, University of South Florida. She was the founding director of the Teaching and Learning Center and the former Dean of the College of Information Technology at Maranatha Christian University. She earned her doctoral degree in Higher Education at the Adult, Career, and Higher Education Administration Department, University of South Florida. Her research interests include the use of instructional strategies in higher education, faculty development practices, instructional technology in education, e-learning, and leadership or management of higher education.

Robert F. Dedrick is a Professor in Research and Measurement Department at University of South Florida. His research interests include the use of structural equation modeling to examine measurement quality of psychological instruments, the analysis of change using hierarchical linear modeling, and mentoring in doctoral education. His work has been published in Psychological Assessment, Journal of Outcome Measurement, Educational and Psychological Measurement, Sociology of Education, and Mentoring and Tutoring.

James A. Eison is a Professor in Higher Education at the Adult, Career, and Higher Education Administration Department, University of South Florida. He was the founding director of Southeast Missouri State University's Center for Teaching and Learning (1985 - 1990) and the founding director of the Center for Teaching Enhancement at University of South Florida. He has served as the President-Elect, President, and Past-President of the Professional and Organizational Development Network in Higher Education (1998-2001). His research and publications mainly focused upon topics related to (a) instructional strategies and techniques, (b) student characteristics that influence learning, (c) assessing, testing, and grading, and (d) faculty development. To date, he has also been invited to conduct faculty development workshops on over 100 campuses in the United States, as well as for colleges and universities in Canada, Kuwait, and New Zealand.