

INFORMATION SYSTEMS EDUCATION JOURNAL

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The **Information Systems Education Journal** (ISEDJ) is a double-blind peer-reviewed academic journal published by **EDSIG**, the Education Special Interest Group of AITP, the Association of Information Technology Professionals (Chicago, Illinois). Publishing frequency is six times per year. The first year of publication is 2003.

ISEDJ is published online (<http://isedj.org>) in connection with ISECON, the Information Systems Education Conference, which is also double-blind peer reviewed. Our sister publication, the Proceedings of ISECON (<http://isecon.org>) features all papers, panels, workshops, and presentations from the conference.

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Flipping Introduction to MIS for a Connected World

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Abstract:

It has been increasingly challenging to provide an introductory coverage of the rapidly expanding fields in Information Systems (IS). The task has been further complicated by the popularity of web resources and cloud services. A new generation of technically savvy learners, while recognizing the significance of information systems, expects connectivity to current and meaningful information technology. Internet accessible information far outpaced those packaged in a typical textbook, triggering a fresh look into learning resources. Compliance to institutional and accreditation expectations for measured learning outcomes also requires careful revision of course design. This paper presents an approach to deliver a broad scope of Information Systems topics to introductory students with heterogeneous backgrounds and career interests, by "flipping" the overall design of the Introduction to MIS course. This approach has been refined over the last 5 years with promising results. Free tools and web-based sources support the low cost delivery of the course. Assessment tools have been developed to better monitor individual student learning outcome.

Keywords: MIS, Flip learning, assessment, learning resources, knowledge construction, rubric grading

1. Introduction

A course in introduction to MIS (refer to as the MIS course from this point forward) has traditionally served as a foundation course for students seeking careers in IS fields. As information systems become more prominent in organizations, the course evolves to serve as a core course in many business study programs. Gradually, technical and operational topics yield to organizational issues, strategic considerations, global management challenges, and shortening technology development cycles. Indeed, increasing number of MIS textbooks defer technical topics to the optional supplement sections to accommodate the expanding topics. At the same time, several disruptive forces pressure the reinvention of the MIS course. First of all, the inclusion of IT topics in non-IS courses and the indiscriminate usage of the term "MIS" confuse students on the value of the MIS course. Unfortunately, many students begin to see the MIS course as merely an unwelcomed

requirement for graduation. Secondly, a new generation of students comes to the MIS course with new attitudes and expectations. These students have been pampered by intuitive consumer information technology (IT), and expect hands-on experience in the MIS course. In addition, the relevancy and affordability of textbook create unavoidable political pressure from students. Dissatisfied students expect "useful" information from an expensive textbook, and found even richer information from the Internet. Other students rely on older versions of the textbook and complain about the lack of "full guidance" from the instructor in testing. Increasingly, students also pressure the instructor to provide class notes; PowerPoint slides, and reviews prior to taking test. Combination of these events adds to the chaos of instruction for the MIS course. Moreover, rapid shortening of technology cycles and proliferation of information technology compete for student interests in the traditional contents

of the MIS course, threatening the sustainability of the MIS course, especially in an environment of declining enrollment, and abundant substitution. Lastly, new institutional expectation to practice assessment and demonstrate learning outcomes forces the critical review and redesign of all courses, including the MIS course. This paper reports lessons learned from experimentation and modification of the MIS course over the past 5 years.

2. Reexamination of the MIS Course

The MIS course faces an identity crisis as increasing number of non-IS students enroll in the course, while selected IS topics are being incorporated into non-IS courses. Table 1 shows recent distribution of the declared majors of students enrolled in the MIS course. It is clear that a majority of the students in the MIS course will be non-IS majors. The handful of Computer Information Systems (CIS) students actually came from a different program from the Science College. Since it is unlikely that a human resource management student will be concerned about an inventory system, nor for a tourism student to be interested in a supply chain management system, a course design consideration is whether to require all students to study all IS topics. At the same time, many accounting students take Accounting Information Systems, a course that potentially overlaps topics with the MIS course. The CIS students, while enrolling in the MIS course, often avoid the non-technical topics in the MIS course. Immediately, there is a need to motivate students to attend class. Another dilemma emerges when considering the inclusion of hands-on experience, when some students may learn similar materials in a non-IS course. Time constraints and the drastically different IT backgrounds of the students make it almost impossible to squeeze in any meaningful technical training. An even greater challenge is in the task of assessing student learning outcomes, with the spread of student prior knowledge. The rapid adoptions of IS topics in non-IS courses further undermine the value construction of the MIS course. Table 2 shows a sample of IS topics in non-IS courses. The MIS course must justify its unique value contribution by going beyond merely coverage of definitions and basic concepts. The constantly changing mix of students makes it extremely difficult to select and address topics potentially of interest to a

class of students with diversified backgrounds and career interests.

Major	Count
Accounting	5
Chemistry/Accounting	1
Computer Information Systems	5
Finance and Economics	11
Finance and Human Resources	1
HR Management	5
HRM and Entrepreneurship	1
International Tourism	3
Tourism and HR	1
Undeclared	1
Total:	34

Table 1: Majors Distribution

IS Topic	Non-IS Course
Excel	Accounting
E-Business	Marketing
Systems Development	Accounting IS
Simulation	Business Strategy
Website Construction	Marketing
Business Analytics	Business Statistics, Finance
HRIS	HR Management
Government IT	Public Administration
Healthcare IS	Nursing
Multimedia Systems	Education
GIS	Geography, Urban Planning
CRM	Marketing
ERP	Accounting

Table 2: Sample of IS topics in non-IS course

3. Flipping Learning Objectives for Richer Experience

Initially, the adoption of a textbook with an update topic list was considered as a solution to draw student interest. Table 3 presents a sample of updated topic list in a recent textbook. However, the expanded topic list with overwhelming details seemed to add frustration to the non-IS students, most of whom have yet to develop interest in IS topics. A revised course design with core topics and elective topics seems to be more effective for the new generation of students.

Business Information Systems Overview
Strategic Uses of Information Systems
Functional Information Systems
Business Information Technology
Information Systems Architecture and Networks
E-Business
Data and Knowledge Management
Decision Support Systems and Intelligence Systems
Information Systems Development
Information Project Management
Integrated and Global Information Systems

Table 3: Sample updated textbook topic list

Today's students are computer and Internet savvy, skilled in online information search, and crafty in the assembly of information report from web excerpts. They learn just-in-time, love learning by exploration, and expect relevancy in their learning experience. They study hours before test, seldom read the textbook before class, and use study notes and PowerPoint slides instead of textbook. They are fast to sift through volumes of information, but sorely need guidance to select and digest information. They love and expect accommodation of their own individual learning styles. The Grasha-Reichmann learning style questionnaire (GRLSQ) categorizes students as either dependent, collaborative, or independent learners (Reichmann & Grasha, 1974). Thus while some students expect structured lectures and course activities, some expect interactivity with the instructors, others may rebel against planned learning activities. This is a consistent challenge when working with students with heterogeneous career aspirations. Keirse-Bates (Keirse & Bates, 1984) classified learners through the Myers-Briggs Type Indicator (MBTI) using four personality scales: Introvert/Extrovert, Sensing or Intuitive, Thinking or Feeling, Judging or Perceiving. Frequently, non-IS students have drastic different learning styles from IS students. This explains difficulties in delivering lessons to non-IS students using contents and pedagogical methods initially designed for IS students. It is particularly difficult when selecting hands-on experience and class projects. What is fun and challenging for one group of student appears as boring task for other students. More significantly, the new generation of learners does not consider hard work a factor of learning, but expect learning to be fun. They avoid mundane, repetitive works,

but immerse themselves into meaningful, challenging tasks (Law, 2011).

Keeping in mind the traits of current students, the core topics are timeless, and applicable to broad organizational and global settings. Instead of requiring students to memorize a selected set of definitions and concepts, they were assigned to explore the expanding scopes of information, management challenges and solutions relevant to the core topics. Table 4 presents a list of core topics. The core topics account for approximately 16 hours out of 45 contact hours. For example, the topic "information Resources and IT roles" allows the coverage of any hardware, software, data, infrastructure or personnel issues. The "System Development" topic allows coverage of all in-sourcing or out-sourcing software projects, as well as contracted services. Further details on revised instructional strategy will be presented in a later section.

Information Resources and IT Roles
IT and Business Strategy
Systems Development (in-source or out-source)
Information Systems in Business
E-Business

Table 4: Sample Core Topics

In addition to the core topics, elective topics are also included to ensure student awareness of important IS/IT trends and developments. The elective topics are determined together by the instructor as well as students enrolling in the MIS course. The instructor selects the elective topic list for each course, and the students bid for the topics as teams. Each student team is then allowed to define the scope of the topic, based on the interest of the team and the available online resources. The elective topics account for about 17-20 contact hours, with the remaining contact hours reserved for class administration and experiential, hands-on activities. Table 5 shows a list of potential elective topics, which will be refreshed periodically according to current trends, available resources, and student interests. For example, while the students learn about general information security issues in a prerequisite course, mobile information security presents new challenges with a shift of IT applications to mobile devices and mobile platforms. The students have the option to propose and negotiate an elective topic to work on.

Ethics, Compliance, and Information Policy
Customer Relationship Management
Mobile Commerce (GPS, GIS, LBS, payment system)
IT Infrastructure
ERP
Cloud Computing
Supply Chain Management
Global Information Resources Management
Database and Data Warehouse
Networks, Telecommunications and Wireless Computing
Collaborative System
Project Management
Mobile Information Security

Table 5: Sample Elective Topics

After the presentation of each student team, the instructor fills in knowledge gap by correcting misconception, further explaining difficult concepts, and presenting omitted information as permitted by class time. This is similar to reported "Flipped Learning" (Frydenberg, 2013; Lage, Platt, & Treglia, 2000). The students responded positively to this arrangement that allows them to explore IS topics that are potentially relevant to the personal experience of the students.

4. Flipping Learning resources in a connected world

The proliferation of information through the Internet, and alternative educational resources and channels challenge the value of instruction centered on a textbook. The acceptance of an electronic future in higher education relaxes the expectation on tying a course to a textbook. As the cost of textbook spirals to the point of being unaffordable for many students, maddening revision cycles of textbook make it exhausting for the instructor to keep up with course preparation. To save cost, students secretly utilize multiple versions of textbook, creating unpredictable behaviors in the learning process. Some students even attempted to borrow a textbook from the instructor to study for a test! In fall 2012, a free online e-book was adopted in place of a regular textbook as a required textbook, with the expectation for students to utilize the e-book for their studies. Chapters of the e-book were included among the elective topics. Surprisingly, very few students selected topics from the e-book, and instead, found their own online information sources to present topics of their choices. As a matter of fact, very few

students utilized the free e-book as reference source for their research assignments.

In spring 2013, the online e-book was relabeled as an optional textbook, and there was no official textbook for the course. A Google Site was created to provide students with notes, PowerPoint slides and web links on core and elective topics. PowerPoint set found online, along with PowerPoint submitted by previous student teams were made available to the students. The learning resources were given to the student with no guarantee for the quality or completeness of the information. The student teams were expected to make a presentation on a selected topic with critical analysis of available information. The students were encouraged to utilize online resources, using information placed in the Google Site as starting references. All student teams must share their presentation media through the Google site to the entire class of students. The student presentations were impressive, including nice graphics and video. Many presentation media were superior to those provided by textbook publishers, and including current information not found in textbooks! At the end of the semester, students were asked in a survey question whether they recommend using a textbook in the course, 100% of those who took the survey responded "No, I do not really need a textbook to learn". This suggested that structured information, like a textbook, is not an important factor of learning for the new generation of students.

5. Flipping Memorization of facts to the Construction of Knowledge

The elimination of a textbook requires modification of assessment approach. Students seem to prefer learning by exploration over learning by memorization. Since each student team utilized different learning resources for their learning, it was no longer meaningful to assess learning through standardized tools such as written tests. When given a choice, students voted to construct knowledge bases in place of written tests. The Knowledge Bases were designed as continuing efforts of the topic presentations, but students were given the option to work as teams or individual. While students must provide critical summaries of key concepts in their presentation, they must organize detailed information in the Knowledge Bases. Table 6 shows the groups of information that students may earn credits on. Many student

teams presented incredible collections of information. The Knowledge Bases provided the core reference sources for students to create enriched information in the class wiki project for digital storytelling (Bromberg, Techatassanasoontorn, & Andrade, 2013), while practicing their skills in team collaboration and project management. When surveyed at the end of the class, 100% of students indicated "Yes, I learned from the Knowledge base project" over "No, I rather just take tests", even though the Knowledge Bases required more works.

List of key concepts
List of key terms
List of key software products
List of key web-based services
List of key data management issues
List of key technology
List of key supports/users
List of key reference sources
Key concepts with 10-30 words description
Key terms with 10-30 words description
Key software products with 10-30 words description
Key web-based services
List of relevant video

Table 6: Knowledge Construction Credits

6. Flipping evaluation to document learning and critical thinking

The most important change in the course design has been a new learning evaluation and assessment method. This is a direct response to the institutional mandate on learning assessment. Recent institution accreditation requirements expect demonstration of learning outcome of core competencies including, but not limited to, written and oral communication, quantitative reasoning, information literacy, and critical thinking (WASC 2013 Handbook of Accreditation Penultimate Draft- March 2013, p. 28). The MIS course now pegs its existence on providing evidence of learning outcomes to support the program and institutional learning objectives. Therefore, it is insufficient to show the test score distribution of students in written tests, the adoption of a popular textbook, or the completion of assignments by students. Instead, it is necessary to report that students demonstrate critical thinking and problem solving through class activities. Kolb (Kolb, 1981) pointed out the different learning styles in handling information. Instead of measuring percentage completion toward a few goals,

student learning is continuously monitored throughout the course. Students earn credits on class attendance, as well as class contribution, including peer evaluation tasks. Evaluation tools have been designed to measure student works against a targeted level, as well as allowing bonus opportunities when a student exceeded the expected learning target. In short, students have been relieved from the pressure of failed efforts, and provided ample opportunities to make up for credit shortfalls, as well as making advance progress toward their targeted course grade. Table 7 presents a sample of the grading scheme used for the MIS course. Figure 1 shows the tool for presentation assessment and Figure 2 shows the e-forum assessment tool.

Figure 1 Sample presentation assessment tool

Presenter:	Weight	4	3	2	1	0
Organization of content	1					
Presentation Style	2					
Communication Aids Effectiveness	1					
Conciseness of presentation	1					
Depth of Content	1					
Accuracy of Content	1					
Use of Examples	1					
Use of Language and Expression	1					
Objectiveness of Expression	1					
Personal Appearance	1					
Verbal Tone & Clarity of Speech	1					
Audience Interaction	2					
Body Language	1					
	15					
Comments:						
<input type="text"/>						
Business Challenges discussion	20					
Presentation media aid	20					

A. Acquire Core Knowledge	
Core Knowledge demonstration	20%
Topic presentation	10%
Discussion/e-forum	20%
B. Understanding and Critical Analysis	
Business IT research/project	32%
Special class project	18%

Table 7: Sample Grading Rubric

Figure 2 Sample E-Forum assessment tool

Eforum Evaluation						
	Weight	0	1	2	3	4
Core Knowledge	2					
Structured Presentat	2					
Managerial Analysis	3					
Response Completer	1					
Persuasiveness	2					
Unique Perspective	2					
	12					

The major course assignment is an individual research assignment, where students competitively bids for a topic from a list of approved research topics. The research assessment rubric is provided to the students upfront to ensure that they prepare the research report according to the evaluation criteria. Figure 3 shows the research evaluation rubric. The key design of the rubric is to measure the critical thinking of students, include their ability to collect, digest, and organize information, and persuasively present a critical review based on the collected information. The instructor clearly explained the use of the rubric and its relationship to assignment grade. For example, level 7 on the rubric scale of 10 has been chosen to reflect approximate 100% score on the assignment. Thus students are assured that outstanding effort will be recognized. All assessment tools are designed to measure strength and weakness of students in their submitted works. For example, poor performance on the individual research assignment does not automatically disqualify a student from a "A", as long as the student performs "beyond expectation" in most the other class activities. The top ends of the measurement scales indicate "beyond expectation" performance. Hence, a student only has to demonstrate sufficient "outstanding performance" to qualify for a good course grade, and it becomes pure experience and fun beyond that point. Once a student accumulated sufficient credits for a course grade, the student is no longer obligated for further class works. Amazingly, many students performed the extra work, just for their "pride".

Figure 3 Sample Research assessment tool

Name	Weight	Basic Quality of Report				Superior Report Quality					Total		
		0	1	2	3	4	5	6	7	8		9	10
Background:	2												
Significance of Issue:	2												
Affected Organization/Users:	2												
Changes Management:	2												
Geographic location:	1												
Promoters:	1												
Economics:	2												
Cultural and Social Factors:	2												
Legal and Ethical Factors:	1												
Performance	1												
Reference List	2												
Downloaded Home Page	2												
Research Depth and Quality	4												
Critical Thinking	4												
Mastery of research topic	3												
Webpage Design/organization	2												
Writing Style / Presentation	2												
Quality	35												
Comments													

7. Flipping Learning Progress to nurture Deep Learning

To encourage serious efforts on the course materials, students were allowed to participate in making the course schedule. The instructor handled the first few weeks of the course, to provide orientation and background information on information systems management, including a timeline discussion of events and developments up to the current year. This also provided sufficient time to finalize schedules for various course activities. Students proposed and scheduled presentations, and voted on due dates for various assignments before the course schedule being finalized and distributed to the students. Once the course schedule has been finalized, a class policy governed the extent that students may swap presentation dates and request changing of due dates. Students were given total freedom to join class activities, each of which provided credit opportunities. Success was measure solely on the total credit points, regardless of how the credit is earned. This method seemed to encourage students to make more thorough preparation for their assigned tasks. There was also a virtual component of the course once students have completed all preparatory and in-class activities. Instead of attending regular class meetings, students were then allowed to meet in groups in time and place of their choice to work on class projects. The instructor served as a consultant on demand for student teams and individual students. It was interesting to observe student activities on the class wiki project. Often students show little

activities for weeks, and suddenly propagated the wiki with rich contents, days, and even hours before the project deadline.

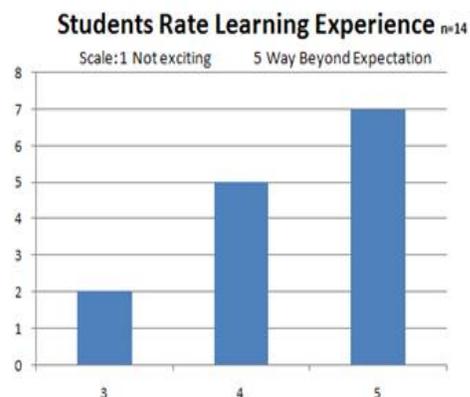
8. Results and Conclusion:

The current format of the MIS course is the outcome of years of experimentation and innovation. The most immediate observation is improved student motivation towards learning IS topics, especially with the recent adoption of dynamic course contents to match interests of the non-IS students with diversified backgrounds. There is evidence of high student satisfaction, through comments written in course evaluation and feedback survey (Table 8 & Chart 1). This is a very satisfactory achievement since the MIS course has been considered by students as one of the most difficult courses in their college experience. A side-product of the revised MIS course is heightened technical skills of students through the courses. All students can construct a website using offline web building tools, and learn to operate wiki, and many consider these the most valuable learning experience in the MIS course.

Had a wonderful experience
The website was hard but very necessary learning experience
I learned a lot in this class
On hand learning experience was great!
...encouraging students to be active learner
The class got interesting, fun, & exciting
Stress how students should learn the key concept, ensures student think critically
This course is very interesting...I find it very convincing and interesting in learning more in not only this course, but from the whole similar area as well

Table 8: Sample Positive Comments from Evaluation

Chart 1 Student Reflection of Learning Experience



The individual research assignment has been plagued by plagiarism for a long time, partially due to the ease of copying information directly from web sites. Many students were packaging just sufficient information in their research reports to please the instructor in order to receive a passing course grade. When each student is assigned a different research topic, and encouraged to properly quote online information, incidence of plagiarism in submitted work declined close to zero. Grading is simplified since there is no need to look for unique information. Instead, the focus is on how a student collects and utilizes information to support a managerial position in critical analysis. The ability to work with "real time" information adds meaning and relevancy to class activities.

The MIS course is evolving to become an effective platform for introducing IS topics to students. The end of course survey requested students to indicate interest in elective IT courses. Table 9 summarizes healthy student responses on elective IS course. This is significant considering that many students postponed the enrollment in the MIS course until the graduating semester, merely to fulfill program requirement. It is worth noticing how non-IS students are interested in technical topics. This insight hints at the feasibility of organizing advanced IS courses for non-IS students.

What kind of elective IT course will you take? n=14, 13 responded to this question	
Elective IT Courses	# Positive Responses
Database applications	7
Current IT trends and cloud computing	7
Develop mobile apps	9
Business data analysis (Business Analytics)	7
Practical business applications with iPad	6
E-business development	8
Mega IT global trends and business IT readiness	4

Table 9: Student Vote on IT Elective Courses

The MIS course has established systematic assessment of learning outcomes, and is one of a few courses that has closed the loop of assessment through progressive improvement of course delivery according to student feedback

and performance. In doing so, the MIS course is currently suitable for students of all majors; potentially opening new opportunities for IS training. Enrollment demand consistently exceeds supply of available instructional resource.

However, more data is required to confirm these preliminary observations. There are many questions pending further investigation. The following are a sample of questions that may command general interest:

Have we assured that student learned all the basic IS concepts? The answer is no, but neither could we assure the learning outcomes by sampling knowledge through testing. However, we have evidence of learning when students successfully assimilated scattered information and concisely articulated key IS concepts. There are further evidence of the effectiveness of the Flipped design when student indicated interests in elective IS courses. The course format outlined in this paper may not be suitable to ensure that students command a specific body of knowledge, such as the requirements for certification. On the other hand, students interested in certification can utilize online tutorial.

Have student learned sufficient basic skills in software design? The answer is probably not, but students gain sufficient perspective on factors relevant to IS decisions, as well as relationship between existing IS and emerging technology and information management practices. In this case, software design topics are really irrelevant learning experience for non-IS students in the MIS course. However, this may be an attractive format if the students have the option of taking a "Systems Design and Analysis" course. Helping non-IS students to appreciate the IS perspective could be beneficial to the long term relationship between IS and other functional areas.

Have we covered most of the topics in a typical Introductory textbook? The answer is no because the course design objectives are focused on learning outcomes rather than information packaged in any textbook. Student responses indicate that they place low value in a textbook. We are assured that students have been exposed to more IS topics than a typical textbook, and there are some evidence of depth learning through the quality of student research

projects and the class project. However, this can create inconvenience for students planning to transfer credits between institutions.

Is the Flipped design scalable? This MIS course design seems to work very well for small size class. The development of additional team project management tool can easily support scaling to class size of 40 to 60. This flipped design was initially prepared for 20 students, but was modified to accommodate up to 40 students. As in the case for any highly interactive course, the increased number of student definitely will increase the instructor workload, which is manageable through various web-based services. The key is to carefully design learning resources and team assessment tools, including the design of roles in a team.

This reported "Flipped" MIS course is considered a "stabilized" class format that will require further refinement. Two areas that will require immediate improvement are scaling, and assessment. The streamlining of learning resources and improving design for student roles should support class size up to 60 students. The improvement of assessment tools will hopefully lighten the increased grading workload with large class size.

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