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Utilizing Snyder's "Fluency With Information Technology" In An Undergraduate "Introduction To Information Systems" Class

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Abstract: This paper describes the authors' experience using Snyder's "Fluency with Information Technology" textbook in an undergraduate Introduction to Information Systems course. Unlike many traditional Information Systems textbooks, Snyder's book is focused solely on Information Technology. Topics covered in this paper include our justification for using Snyder's textbook, strengths and weaknesses of the textbook for an IS course, and the implementation and replacement of the textbook's student lab exercises.

Keywords: information systems education, information technology, fluency with information technology

EDSIG activities include the publication of ISEDJ, the organization and execution of the annual ISECON conference held each fall, the publication of the Journal of Information Systems Education (JISE), and the designation and honoring of an IS Educator of the Year. ● The Foundation for Information Technology Education has been the key sponsor of ISECON over the years. ● The Association for Information Technology Professionals (AITP) provides the corporate umbrella under which EDSIG operates.

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"Fluency with Information Technology"
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ABSTRACT

This paper describes the authors' experience using Snyder's "Fluency with Information Technology" textbook in an undergraduate Introduction to Information Systems course. Unlike many traditional Information Systems textbooks, Snyder's book is focused solely on Information Technology. Topics covered in this paper include our justification for using Snyder's textbook, strengths and weaknesses of the textbook for an IS course, and the implementation and replacement of the textbook's student lab exercises.

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1.   INTRODUCTION

There has been a significant amount of discussion concerning what material should be covered in an introductory course in Information Systems (IS) for undergraduate business students (Ives, 2002). Information Technology (IT) is clearly an important component of any Introduction to IS curriculum. Therefore we decided to adopt Snyder's "Fluency with Information Technology" textbook (Snyder, 2004) for use in our undergraduate Introduction to IS course. Snyder's book is focused solely on IT. Nevertheless, we found that, with some additional support materials, Snyder's book is a good choice for an undergraduate Introduction to IS course.

We, as the faculty members of the Computer Information Systems (CIS) department of the School of Business, made a conscious effort to make our undergraduate "Introduction to IS" course more IT-centric. We wanted to cover in greater depth certain IT topics that we felt would be particularly useful to undergraduate business students re-gardless of their major. There are two main reasons for this decision. First, for a great majority of our students, Introduction to IS is the only required course that introduces and integrates important aspects of IT. Therefore, "Introduction to IS" is the only technology-focused course that many of our students will be exposed to prior to joining the workforce.

Secondly, our Introduction to IS course is also the first IS specific course taken by the CIS major. The students taking our Introduction to IS course are typically freshman and sophomores – students who are usually undecided about their major. The CIS major, at our school, consists of 6 courses – a majority of which are focused on solving business-oriented problems using applied IT.

In the rest of this paper we describe the motivation behind Snyder's book, the book's strengths and weaknesses for an undergraduate Introduction to IS course and how we integrate the book's chapters and lab assignments into our Introduction to IS

course curriculum. Collectively, the authors have used the text for nine sections (over a two year period) of an undergraduate Introduction to IS course.

2. FLUENCY WITH INFORMATION TECHNOLOGY

Snyder's book, the full title of which is "Fluency with Information Technology: Skills, Concepts & Capabilities", was inspired by the National Research Council (NRC) report entitled "Being Fluent with Information Technology" (National, 2003). Snyder was the chairman of the NRC committee that was responsible for the report. The report recommended teaching computer literacy as package of skills, concepts and capabilities wrapped in a project-oriented approach that ensures that the content is fully integrated. The author's of the report felt this approach would help prepare students for life-long learning (Snyder 2004).

The textbook was designed to implement this form of computer literacy education (dubbed FIT by the NRC report). FIT sounded very much like what we wanted to achieve, albeit within the context of an Introduction to IS Course.

Central to FIT, and what we feel sets Snyder's book apart from other IT texts, is the focus on combining skills, concepts and capabilities. According to the text, skills refer to proficiency with contemporary computer applications such as email, word processing, web searching, etc. Concepts refer to the fundamental knowledge underpinning IT, such as how a computer works, digital representation of information, assessing information authenticity, etc. Capabilities refer to the higher-level thinking processes such as problem solving, reasoning, complexity management, troubleshooting, etc. (Snyder 2004).

Examining other IT textbooks we found them to be either too operating system or application specific, or too shallow in their coverage of certain IT topics. The latter being the reason we also choose to steer clear of many traditional IS textbooks. For example, we reviewed a number of IS textbooks that spend chapters discussing various types of application software yet never really explain what software really is. Software is essentially a collection of bits that specify which operations a CPU will execute. We believe this is a fundamental concept that unfortunately is not really adequately covered in most texts. The Snyder book dedicates a chapter to describing, at a very high level, how a program gets executed on a simple generic CPU.

Snyder's textbook focuses on four main topics: networking (network basics, the Internet and the web), computing (data representation, computer hardware, and algorithms), database design (principles and SQL) and basic computer programming (using the JavaScript programming language). The first three of these topics are typically covered in an Introduction to IS class.

The textbook's target audience is "non-techies", students who will *not* be majoring in science, math or engineering. This perfectly describes the students that take our Introduction to IS course. There are no prerequisites and only a basic arithmetic background is assumed.

As an aside the textbook, which is published in paperback, is slightly more than half the price (about seventy five dollars) of other traditional textbooks used and marketed for undergraduate IS courses. While this should certainly not be the most important consideration in adopting a textbook it does allow the text to be supplemented with other material that could cover topics missing from Snyder's book.

3. SYLLABUS

Although we wished to create a more applied Introduction to IS course, we didn't want to stray too far away from material that is traditionally covered in such a course. Our choice of syllabus topics is well within the IS 2002 curriculum (Gorgone, 2002) recommendations for an Introduction to IS course.

Our current Introduction to IS course syllabus is shown in Table 1. Note that the syllabus includes the relevant chapters in Snyder's book. We do not cover all the material in some chapters – we occasionally skip some sections. The second edition of the textbook was released in July 2005. This second edition includes a number of rewritten chapters and a chapter on using spreadsheets. Except where noted in the syllabus, the chapter order has remained the same in the second edition.

Topic	Chapters
Introduction (What is an IS, IS in Business, Types of IS, Management of IS)	Class notes
Networks (Internet, WAN, LAN, addressing, naming, DNS, TCP/IP)	3
WWW (web software, HTML)	4
Search Engines (information organization, querying, paid advertising, security issues – spoofing, phishing)	5
Information Representation (Bits, Bytes, representing text, ASCII)	8
Computers (basic computer architecture, software, operating systems, programming languages)	9
Building Information Systems (SDLC, waterfall and iterative models, legacy systems, COTS, outsourcing)	Class notes
Software Distribution (source code, binary code, Free Software Foundation, open source, licensing agreements, intellectual property)	12
Databases (database functionality, data mining, database software functionality, relational databases, SQL)	13 (first edition only), 14,15, 16 (second edition only)
Security (E-commerce, privacy, anonymity, basic cryptography, PKI, Firewalls)	16 (first edition only), 17

Table 1. Introduction to IS Syllabus

Clearly the textbook alone does not completely satisfy the needs of our Introduction to IS course. More specifically, the textbook does not provide the important links between IT and its usage by a modern business. The text is also lacking material on building information systems. However, we found that this material can be covered adequately using PowerPoint presentations and other supplemental material (case-studies, etc). As the focus of this paper is the use of Snyder's book we will not further elaborate on topics that the book does not cover – although this is a problem with the text from an IS point of view.

Note that we first utilize the textbook starting at Chapter 3. Chapter 1 covers basic IT terminology such as hardware and software and describes, at a very high level, the basic parts of the computer (hard drive, monitor, etc.) As these topics are covered in greater detail in Chapter 9 and 10 we skip Chapter 1. Chapter 2 covers graphical user interfaces (GUIs) and human-computer interaction. We found the material in this chapter to be too elementary as all of our students use oper-

ating systems and applications that provide GUI-based font-ends and use e-mail and the web on a daily basis.

Chapters 18 through 23 cover programming in the JavaScript programming language. JavaScript is a scripting language that is interpreted by web browsers. JavaScript programs are embedded in HTML code and typically utilized to perform client-side processing, such as validating form fields. We do not cover this material in our Introduction to IS course although we do have the students complete a lab on very basic computer programming using the Python programming language (Python 2005). The lab and the justification for its use are described below.

4. EXERCISES

At the end of each chapter are three different types of exercises: multiple-choice, short-answer (fill-ins), and long-answer. The multiple-choice and short-answer questions are typically very easy and can be answered directly from the text. The text provides the answers to all of the odd-numbered multiple choice and short-answer questions. The

long-answer questions are more challenging and typically require the student to explain a concept or investigate and describe some resource mentioned in the text (e.g. a web site or program). Answers to the long-answer questions are not given in the textbook. We typically assign multiple-choice and short-answer questions for homework. Rather than assign the long-answer questions we typically assign questions based on material that was discussed in class but not necessarily in the Snyder textbook (e.g. case-studies, etc.).

5. LABS

As previously stated, Snyder's textbook focuses on three types of knowledge: concepts, capabilities and skills. The first two of these, concepts and capabilities are meant to be fostered and strengthened in lecture and in textbook readings. However, skills knowledge is supposed to be acquired in the lab. Toward this end, the book provides a number of self-contained lab exercises. By self-contained, we mean that the student should be able to complete the lab assignment without additional material provided by the instructor. Not every textbook chapter has a corresponding lab assignment – slightly more than half the chapters have associated labs. The lab material can be freely downloaded from the textbook's web site – http://www.aw.com/snyder.

The first edition of the textbook has 14 labs – many of which were for chapters that we did not utilize in our Introduction to IS course. The second edition added additional labs that cover spreadsheet software (Microsoft Excel). As far as utilization in an Introduction to IS course, these labs are not one of the book's strengths. As previously stated, many of the chapters that we cover in our course do not have corresponding labs. In addition, we found some labs were too easy or not particularly relevant to our IS focus. Therefore, in several cases we designed our own labs and, in one case, slightly modified a lab that was being used at another college. The labs that we developed can be freely downloaded from the URL listed in the summary section below.

In our Introduction to IS course, we typically assign six lab assignments. The lab assignments are conducted in a computer lab and utilize class time – that is we set aside six

lectures for lab work. Our Introduction to IS course consists of three, one hour, lectures a week for fourteen weeks. Therefore, in total, two weeks worth of lectures are set aside for lab assignments. The course instructor is present in the lab during the lab assignments and typically helps resolve any technical issues that arise during the lab.

Ever since we first adopted Snyder's book for our Introduction to IS course, we experimented with a number of different lab assignments. We now briefly describe these lab assignments and our experience with them.

As Table 1 indicates, the first IT topic that we cover is networking (Chapter 3). The lab assignment associated with this chapter essentially covers two main topics – Internet addressing (Internet Protocol (IP) addresses, domain names) and file transfer (using File Transfer Protocol (FTP)). To date, we have not used this lab in our Introduction to IS course. The main reason for this is that we felt the material could be adequately covered and demonstrated in class. In addition, FTP is briefly touched upon in the HTML lab when students transfer their web pages to the School's web server.

As an aside, the motivating example that we use to introduce the students to IP addresses, and Internet addressing in general, is the Recording Industry Association of America (RIAA) crackdown on illegal music downloads. This has been, and continues to be concern of students. We work through an example wherein the RIAA learns the IP address, and ultimately the identity, of someone who is downloading music illegally. Many students find this to be one of the most interesting lectures of the course and frequently ask questions concerning other types of file sharing -particularly peer-to-peer networks such as Kazaa (Kazaa 2005).

We have found Snyder's HTML lab (associated with Chapter 4) to be particularly good. We have used it in every undergraduate Introduction to IS course we have taught since adopting Snyder's book. The lab focuses on building a simple web page using a plain text editor. The page is built incrementally and after each change the student is encouraged to view the updated HTML page in the web browser. Although the preferred way to create web pages is to use a special web page editor, such as Microsoft FrontPage or Mac-

romedia's Dreamweaver, this method allows the student to view the underlying HTML used to render the page. We believe that an additional (perhaps optional) lab that explores web page creation using one of these special web page editors should be assigned to students. We are currently exploring the idea of basing this new lab on the freely available and open source Nvu (Nvu 2005) web page editor.

The lab associated with Chapter 5 (search engines) focuses on using the search engine Google. We utilized this lab only once as we didn't find the lab particularly interesting. Similar to the Chapter 3 (networking) lab much of this material can be adequately covered in class and furthermore students use Google all the time. That said, we believe that the lab could be improved by incorporating additional material on Google's special search commands such as "daterange", which allow the users to narrow searches based on specific dates that a page was indexed.   The only special Google search command that the original lab covers is "site", which allows the users to narrow the search based on a specific site or domain name. We found the book "Google Hacks" (Calishain, 2003) to contain a number of interesting tips that could be incorporated into a searching lab. Lastly, the student exercises accompanying this lab have a distinct IT flavor – students are asked to perform search for ENIAC and the "Analytical Engine". These can easily be replaced with questions more appropriate to an IS course.

The textbook does not provide labs for the material in Chapters 8 (Information Representation) and 9 (Principles of Computer Operation). However, we have created two labs that attempt to introduce very basic computer programming concepts. We use the Python programming language (Python, 2005) in these labs. Python is an open source scripting language that runs on a number of platforms and can be freely downloaded. A simple interpreter and editor are also provided with Python. The Snyder book does devote several chapters to programming in the JavaScript programming language and provides a number of labs to help students learn programming concepts. However, programming is not the focus of our class – the purpose of our Python labs is just to give the student an idea of how software is created and how it runs on the com-

puter. In addition, JavaScript is a web-specific language. We do not feel it is an appropriate mechanism to show students how software is created – there is no compilation process and an executable cannot be built from JavaScript source. The first of our Python labs utilizes Python's interpreter and introduces the concept of executable statements, strings and variables. The second lab introduces the student to the "if" statement and provides the code for a very basic text-based calculator. This calculator only adds and subtracts. The student, as part of the lab assignment, simply needs to add a few more lines to the Python code provided to allow it to perform some additional operations such as multiplication and division. The second lab utilizes a text editor and shows students how to compile the Python code.

As previously stated, the topic of building Information Systems is not covered in Snyder's book. Therefore, for this topic, the students rely mainly on the material provided by the instructor. Students are also encouraged to read the relevant chapters from several traditional IS textbooks that are placed on reserve in the library. To reinforce the material covered in class we developed a lab that utilizes Microsoft PowerPoint – although any presentation package could be used instead. The first part of the lab guides the students through the process of creating a PowerPoint presentation about the Systems Development Life Cycle (SDLC). In the second part of the lab, the students must create a PowerPoint presentation that describes both the waterfall and iterative model.

The textbook provides three labs covering the topic of databases. In these labs students build and modify tables using Microsoft Access. We did not feel it was appropriate to spend three separate labs covering database technology. In addition, the labs covered some material that we do not discuss in class. Therefore, we use a more concise, freely available, Access tutorial created by Richard Holowczak at Baruch College (Holowczak, 2002). We needed to slightly modify the tutorial so that it could be used with the latest version of Microsoft Access. Our students complete the tutorial and then submit the complete database to the instructor.

The final topic of the course is computer security. Snyder's book does not provide a lab to address this topic. Therefore we created a lab based on material that has great significance for e-commerce – digital certificates and encryption. During the first part of the lab the student examines the structure of the certificates that are built into the web browser. The second part of the lab focuses on encryption and decryption using Pretty Good Privacy (PGP 2005).

6. SUMMARY

This paper described our experience using Snyder's "Fluency with Information Technology" textbook in our undergraduate Introduction to IS course. Unlike traditional IS textbooks, Snyder's book focuses solely on IT. We started utilizing Snyder's book in order to cover a number of IT topics in greater depth and to make our "Introduction to IS" course more IT-centric.

Although Snyder's book is not a complete replacement for a traditional IS textbook, we feel that it covers several IT topics in an easy to understand manner without overwhelming the non-technical business student.

We feel that one of the weaknesses of the book, for an IS course, is the lab exercises. Several chapters lack corresponding lab exercises. We have developed a number of labs that we feel are more appropriate for an IS course. These labs can be freely downloaded at http://home.manhattan.edu /~marc.waldman/is_labs.html. The syllabus and corresponding labs are not set in stone – we continue to modify both as our experience with the book continues to grow.

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