THE USE OF INTEGRATED COURSE DESIGN IN DEVELOPING A HEALTH IT COURSE

Chi Zhang
Department of Information Technology
Southern Polytechnic State University
chizhang@spsu.edu

Karen Pace Purcell
Department of Information Technology
Southern Polytechnic State University

Xihui Zhang
Department of Computer Information Systems
University of North Alabama

Abstract:
This paper introduces how Fink’s Integrated Course Design model was used to refine a Health Information Technology (HIT) core course “Clinical Process and Workflow: Analysis and Redesign” for improving the design and enhancing student learning in this rapidly growing field. The paper describes the course design process centered on Fink’s taxonomy of significant learning – foundational knowledge, application, integration, human dimension, caring, and learning how to learn. Example case study assignment, term project and assessment rubric are provided. Student feedback shows that the course enhances student learning and prepares them to meet the needs of healthcare organizations and HIT development.

Keywords: Health Information Technology, Course design, Fink’s model, Integrated course design model, Workflow analysis.

I. INTRODUCTION
Health Information technology (HIT) professionals are in increasing demand as healthcare providers need help in the adoption and meaningful use of electronic health record (EHR) systems while the HIT industry needs workforce skilled in HIT and EHR development. According to Bureau of Labor Statistics, the demand for personnel in medical records and health information technology for the 10-year timeframe between 2010 and 2020 will increase by 21%. The average growth rate for all occupations is 14 percent [Bureau of Labor Statistics Occupational Outlook Handbook, 2012].

In light of this, a regional university in the southeastern United States started an effort in health information technology to design and implement a series of educational programs, including professional development courses, certificate programs, and degree courses. Currently, we have a concentration in HIT in our program of Bachelor of Science in Information Technology (BSIT) and a graduate certificate program in Health Information Technology, which can be taken either as a stand-alone certificate or as part of our Master of Science in IT. In this paper, we will share our experience in the curriculum and course development, specifically the design of the course “Clinical Process and Workflow: Analysis and Redesign” centered on Fink’s Integrated course design model.
Next section provides an overview of the series of the courses for our HIT certificate program. Section III introduces Fink’s integrated course design model [Fink, 2003] and its applications in education. Section IV describes the detailed course design process centered on Fink’s model, followed by the discussion section.

II. HIT CURRICULUM DEVELOPMENT

The Office of National Coordinator for Health Information Technology (ONC) for workforce development identified new health IT professionals in 12 workforce roles [ONC, 2011]. Taking the ONC workforce roles, our student population and existing courses into consideration, as well as in collaboration with health IT experts and professionals, we identified and developed five courses for students with an IT background to focus on training for the eight health IT workforce roles as shown in Table 1. Our current five required HIT courses can be completed in two semesters:

1. Foundations of Health Information Technology
2. Clinical Workflow Process: Analysis & Redesign
3. EHR Systems & Applications
4. Health Information Security & Privacy
5. IT System Acquisition & Integration

Table 1. Roles Prepared and HIT Courses

<table>
<thead>
<tr>
<th>Workforce Roles</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice workflow and information management redesign specialists</td>
<td>(1), (2), (3)</td>
</tr>
<tr>
<td>Clinician/practitioner consultants</td>
<td>(1), (2), (3), (4), (5)</td>
</tr>
<tr>
<td>Implementation support specialists</td>
<td>(1), (2), (3), (4), (5)</td>
</tr>
<tr>
<td>Implementation managers</td>
<td>(1), (2), (3), (5)</td>
</tr>
<tr>
<td>Technical/software support</td>
<td>(1), (2), (3)</td>
</tr>
<tr>
<td>Trainers</td>
<td>(1), (2), (3), (5)</td>
</tr>
<tr>
<td>Health Information Privacy and Security Specialist</td>
<td>(1), (2), (3), (4)</td>
</tr>
<tr>
<td>Programmers and Software Engineer</td>
<td>(1), (2), (3), (4)</td>
</tr>
</tbody>
</table>

In the course “Clinical Workflow Process: Analysis & Redesign”, students are introduced to the fundamentals of health workflow process analysis and redesign as a necessary component of complete practice automation. Students will become familiar with the concepts of processes, process analysis and redesign in the healthcare settings. Workflow and process mapping in healthcare improvement including detailed guidance, helpful tools, and case studies are introduced in the course. Quality improvement methods, process validation and change management are also covered.

The objectives of this course are: (1) Identify the elements involved in providing patient care within a complex health care setting that must be taken into consideration when examining and proposing changes in workflow processes; (2) Create diagram of processes in the healthcare setting that support workflow analysis and re-design; (3) Critically analyze the workflow processes in a selected health care setting to determine their effectiveness from the perspective of those being served (i.e., patients), those providing the services (i.e., professional and non-professional staff), and the organization’s leadership (i.e., decision makers); (4) Propose ways in which quality improvement methods, tools and health IT can be applied within a healthcare setting to improve workflow processes; (5) Suggest approaches that would ensure the success of workflow re-design from development and presentation of the implementation plan, to facilitation of decision making meetings, implementation of the changes, evaluation of the new processes, sustainability of new workflow processes, and continuous quality improvement efforts to achieve meaningful
use; and (6) Apply to these activities an understanding of health IT, meaningful use, and the challenges practice settings will encounter in achieving meaningful use.

This course provides students more insights into healthcare delivery system in the United States, the standard workflows in different healthcare settings and how to analyze and redesign the current workflows to accommodate adoption of electronic health record systems. As this course is closely related to the healthcare practices and involves many case studies and real world problems, the problem-based learning and student-centered learning strategy is considered in the course design and hence Fink’s Integrated Course Design (ICD) model is adopted.

III. INTEGRATED COURSE DESIGN (ICD) MODEL

Fink’s Integrated Course Design model provides a practical and integrated guidance in the shift from a teaching paradigm to a learning paradigm. It has been widely adopted in design and delivery of student-centered courses [such as Allen and Tannert, 2007; Fallahi, 2011; Ziegenfussa and Lawlera, 2008]. L. Dee Fink in his book “Creating Significant Learning Experiences” [Fink, 2003] proposes taxonomy of significant learning around which a specific twelve step methodology is introduced for designing and redesigning college courses.

Fink’s taxonomy of significant learning is based on and extends beyond Bloom’s Taxonomy [Bloom, 1994] by stressing important learning goals in higher education such as “learn how to learn”. Fink’s taxonomy is not hierarchy but relational. The six areas are identified in the significant learning goals: foundational knowledge, application, integration, human dimension, caring, and learning how to learn as shown in Figure 1. It is believed that significant learning is achieved through in-depth situational analysis; effective teaching and learning activities correlated to the course objectives and appropriate feedback and assessment procedures [Fink, 2003].

Figure 1. Fink’s Taxonomy in Course Design [Fallahi, 2011]

The twelve steps of process for course design, as Utschig, Williams, and El-Sayed summarized [Utschig et al. 2010], are: (1) identifying the situational factors (course size, level, student and instructor preparation, etc.); (2) learning outcomes for the course; (3) feedback and assessment; (4) outlining the course teaching and learning activities in which active learning is encouraged; (5) integrating and aligning learning outcomes, assessment, and learning activities; (6) laying out course topics; (7) choosing teaching strategy for the course such as problem-based learning, team-based learning or accelerated learning; (8) integrating course structure and the instructional strategy; (9) choosing a grading system and assigning appropriate weights to each part of grade; (10) preparing adjustments to potential teaching difficulties; (11) writing the course syllabus to clearly communicate the information to the students, and (12) creating evaluation system for the course and the teaching.

IV. THE COURSE DESIGN USING ICD MODEL

The use of Fink’s Integrated Course Design model with the objectives of Clinical Process and Workflow course led to teaching, learning, and assessment activities designed using problem-based learning strategy.
In the six areas of learning goals, the foundational material was taught using lectures, case scenario videos and assigned readings and was assessed using multiple-choice quizzes and short answer questions. Students applied the foundational material in case studies that were evaluated through rubrics to ensure that students’ work met expectations for each assignment. The material was integrated as the student used additional knowledge and tools in increasingly complex assignments through the semester. The human dimension was addressed in discussion topics that required the student to develop and support positions based on course material and literature reviews. Caring about the course material was encouraged through guest speakers including medical and health IT professionals and through a required clinic visit. The learning how to learn skills were developed through the use of a variety of sources of information and the application of the skills in case studies. Table 2 illustrates the course design using Fink’s model.

Table 2. Using Fink’s ICD Model for HIT Course Design

<table>
<thead>
<tr>
<th>Fink’s Taxonomy</th>
<th>Teaching and Learning Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational Material</td>
<td>Lectures and assigned reading</td>
<td>Multiple-choice and short answer quizzes</td>
</tr>
<tr>
<td>Application</td>
<td>Case studies</td>
<td>Assignment rubrics</td>
</tr>
<tr>
<td>Integration</td>
<td>Increasingly complex case studies requiring use of tools discussed in lectures</td>
<td>Assignment rubrics</td>
</tr>
<tr>
<td>Human Dimension</td>
<td>Discussion topics that required positions supported by research</td>
<td>Discussion rubrics</td>
</tr>
<tr>
<td>Caring</td>
<td>Guest lectures by Medical and IT professionals; Case study requiring clinic visit</td>
<td>Student report and clinic surveys</td>
</tr>
<tr>
<td>Learning to Learn</td>
<td>Discussions and case studies requiring use of a variety of sources of information and the application of the skills</td>
<td>Report and research paper rubrics</td>
</tr>
</tbody>
</table>

Appendix I, II and III display one case study, the clinic visit project requirements and an assessment rubric to illustrate the teaching and learning activities used in the course. The case studies and clinic visit project were well received by the students; as one student commented “the real world assignments were effective. I enjoyed applying the concepts to real world projects.”

V. DISCUSSION

The course “Clinical workflow process: analysis & redesign” was first offered in our program in the spring semester in 2012. Fink’s Integrated Course Design model provided an exciting and insightful guidance during the course design process. By following his twelve steps of course design process, the learning outcomes and learning and teaching strategies were soon identified. The assessments and rubrics were then determined to align with learning outcomes and learning activities. The course design went beyond the foundational materials introduction and integrated real world case studies and several guest speakers including a medical doctor, a HIT project manager, a HIT company personnel recruiter, and an HIT consultant.

Student feedback shows that they are satisfied with the course and they feel more confident in the job interviews as they have talking points about their real-world case study analysis and recommendation projects.

Further research may focus on the measurement of the teaching and learning results, applications to online and international students as most of the international students lack the first-hand experience with the healthcare systems in the United States. The learning portfolio for the course or overall HIT certificate program can be developed and refined.
VI REFERENCE


APPENDIX I

Process diagram assignment

Watch the video titled “How Life Should Be After You’ve Implemented Electronic Medical Records”. As you watch the video, list the process steps (or draw a flowchart) for scheduling a patient visit that are shown in the video. Answer the following questions in a Word document.

Questions:

1. What are the steps in the process?
   Hint: you should present a reasonable list of process steps explicitly stated in the video.

2. Develop a process diagram for the steps in the video. If you are not ready to use any flowchart drawing software yet, a hand-drawn diagram is fine.
APPENDIX II

Term Project Assignment
The objective of this assignment is to analyze 1-2 real-world clinic work processes using skills learned in this class. The report should include an analysis of the current process including process steps, information needs, roles, process flows and data flows. The report should conclude with recommendations for suggested redesigns. The completed EHR survey should be included as an attachment to the report.

To complete this assignment:
1. Choose a provider (a clinic site) and document one or two real world workflow processes (patient scheduling, e-prescribing, lab tests, etc.). If you are not able to find a site to visit, interview staff at a clinic site to obtain the process steps of a specific process. Then, define:
   1) The steps of the process
   2) The decision points (e.g. is the patient new? Does the patient have an appointment? Has any patient information changed? Any exceptions present? etc.)
   3) The information needs (e.g. patient ID and contact information, patient medical records, lab specimen(s), etc.)
   4) The roles involved in the process
2. Create a 1-2 page workflow (ISO 5807) and data flow (Yourdon) to document the process. Other commonly used methods may be used to document the process.
3. Identify any non-standard (e.g. exceptions) or redundant steps in the process you have identified and make redesign recommendations.
   1) Use “process change matrix” and “BRAND change matrix” as templates for your recommendations (see Unit 7 slides). Illustrations are shown below.
   2) If there are none, acknowledge this in your analysis report.

   **Process change matrix example**

<table>
<thead>
<tr>
<th>“As Is” process</th>
<th>“To Be” process</th>
<th>Action required for change</th>
<th>Responsible person(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(example process)</td>
<td>Patient arrives</td>
<td>Patient checks in</td>
<td>Patient pays co-pay</td>
</tr>
</tbody>
</table>

   **“BRAND” change matrix example**

<table>
<thead>
<tr>
<th>Process</th>
<th>Benefits of the action</th>
<th>Risks of the action</th>
<th>Alternatives of the perspective action</th>
<th>Nothing: doing nothing at all</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>(example process)</td>
<td>Patient arrives</td>
<td>Patient checks in</td>
<td>Patient pays co-pay</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Have the chosen clinic take the short EHR adoption survey.
5. Write a professional report about the clinic, the visit or interview process, and the process analysis and redesign recommendation in legible, easy to read format. Add any references in APA format.
### Term Project Assessment Rubric

<table>
<thead>
<tr>
<th>Objective/Criteria</th>
<th>Performance Indicators (total 40 points)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Needs improvement</td>
</tr>
<tr>
<td>Professional report</td>
<td>(7 points) Report includes most required components. Not proofread.</td>
</tr>
<tr>
<td>Define process or processes using definitions and diagrams</td>
<td>(6 points) Process not well defined.</td>
</tr>
<tr>
<td>Identify nonstandard or redundant steps and makes redesign recommendations</td>
<td>(6 points) Recommendations not clearly defined.</td>
</tr>
<tr>
<td>Provider EHR survey</td>
<td>(0 points) Missing</td>
</tr>
</tbody>
</table>