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AN INTEGRATED SYSTEM OF EDUCATION: USING STRUCTURED LEARNING ENVIRONMENTS AND ASSURANCE OF LEARNING TO IMPROVE STUDENTS' HUMAN CAPITAL

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ABSTRACT

Students striving to acquire the capability of contributing to the modern global economy are neither clients nor customers of an educational institution. Rather, students are creators and consumers of their own human capital, the quality of which depends in part on the investment they and their institutions are willing to make in them as they progress through their education. Just as industry integrated quality control systems into its production processes to ensure high quality before the products were made available to potential customers, educational systems can do so too. We argue that the goals of an integrated system of education are not only to demonstrate learning on the part of students, but to provide information about the need, and opportunity, for remediation prior to completion of their chosen degree program. It is thus in the interest of students and their professors to continuously improve the quality of students' human capital to enhance the personal satisfaction of graduates and the satisfaction of their future employers. We offer a path to do so.

INTRODUCTION

Two reports document the business community's perception of a decline in the quality of potential employees' skill sets and readiness for work. The first report, *Are They Really Ready for Work?* (The Conference Board, 2006), suggests that respondents to the Board's survey found a large proportion of potential employees with high school or post-secondary educational credentials either deficient in overall preparation for entry-level positions or seriously deficient in key skills, such as written communication. The second report, *The Economic Impact of the Achievement Gap in America's Schools* (McKinsey and Company, 2009), suggests that "...the underutilization of human potential in the United States is extremely costly....Put differently, the persistence of these educational achievement gaps impose on the United States the economic equivalent of a permanent national recession. The recurring annual economic cost of the international achievement gap is substantially larger than the deep recession the United States is currently experiencing (a 6.3% decline in GDP in the fourth quarter of 2008" (McKinsey and Company, 2009, pp. 5-6). One potential explanation for the perceived deterioration in the quality of recent graduates' human capital relative to that of earlier graduates has been suggested by Arum and Roska (2011). These authors point to the emergence of a system of education where students are seen as clients/customers who demand the right to earn an educational credential without much effort on their part. In this paper we put forth a proposal to integrate a structured learning environment with assurance of learning to improve the quality of students' human capital.

We further suggest that prospective employers, students, disciplines and faculty could reap net benefits from implementing this proposal. To that end, in the literature review of the next section we provide evidence from several action research projects that found that students who are not ready for self-directed learning benefit from a structured learning environment. This is followed by a discussion of the elements of a structured learning environment and how to integrate a structured learning environment with a discipline's assurance of learning processes. Finally, we discuss the limitations our work, offer conclusions and suggest areas for future research.

LITERATURE REVIEW

In light of the criticism of the current education system discussed above, what is to be done? Like Arum and Roska, we reject the idea that students are clients/customers of the educational process. Instead, we argue (1) that students are investors in, and producers and consumers of their own human capital and (2) that the place to address the perceived poor quality of recent graduates' human capital is in the classroom and coursework of students. To that end, we conducted a series of action research projects that focused on student learning goals and outcomes. In particular, we sought to understand how to develop students' skills for life-long learning through increasing their potential for self-directed learning. Self-directed learning is "... a process in which individuals take the initiative with or without the aid of others in diagnosing their learning needs, formulating learning goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes (Knowles, 1975, p. 18)." The evidence gathered in our action research project suggests that "... structure match enhances self-directed learning skills and that courses designed to enhance students' readiness for self-directed learning can do so (Dynan, Cate and Rhee, 2008, p. 96)." That is to say, students who are not ready for self-directed learning perform better in a structured learning environment. As students become ready for self-directed learning, the learning environment should become less structured.

In a second action research project we explored (1) the impact of regular (weekly) student writing (both structured and unstructured) assignments on student performance compared to the performance of students without regular writing assignments and (2) the potential links between writing assignments (both structured and unstructured) and Bloom's taxonomy of learning objectives (1956) (Dynan and Cate, 2009, p. 66). From the evidence gathered in this project we find: (1) that "... writing assignments improve student performance," (2) that "...structured writing assignments serve to improve student performance on lower-order learning assessment activities (i.e., multiple-choice examination focused on recall), particularly among students who were in the main not well-prepared for self-directed learning," and (3) that "... instructors should carefully assess the ability level of their class. Meeting the class where it is, the instructor can define the learning level he or she expects his or her students to achieve and design regular writing assignments that allow students to practice both lower-order and higher-order skills" (Ibid. p. 82).

A third action research project examined variables that were expected to develop self-directed learning skills in students, such as structured writing assignments. We drew three conclusions from this project: (1) that structured writing assignments positively impact student learning relative to unstructured writing assignments, and relative to no writing, (2) that structured writing assignments positively impact student learning and can enhance student readiness for self-directed learning, especially for those students who are not ready for self-directed learning, and (3) that students who are not ready for self-directed learning perform better in a structured learning environment (Cate and Dynan, 2010, p. 57). Collectively, the evidence gathered from our action research projects provide some support for the following conclusions: (1) that a structured learning environment is a useful intervention to support the development of human capital in the educational process, (2) that students who are not ready for self-directed learning experience significant improvement in their performance when instruction takes place in a structured learning environment, and (3) that as students' performance improves it becomes easier to nudge students into believing in the importance of mastering critical thinking, of acquiring a personally rewarding and

marketable competency-based skill set, and of becoming a self-directed learner, findings consistent with those of Dweck (2006) and Pohl (2000).

Discussion

Our research findings lead us to suggest that a structured learning environment is a classroom in which students realize that it is necessary for them to invest their time, talent and treasure in improving their human capital. A structured learning environment requires four specific activities by the instructor. The first is to administer pre-tests in the discipline and to assess the students' readiness for self-directed learning. Pre-testing establishes a baseline measurement of each student's prior knowledge of the discipline's basic principles associated with a specific course - what is the student's prior knowledge of American history? Of microeconomics? Of general chemistry?, and assesses each student's readiness for self-directed learning.

Each test is administered to each student in the course during the first week of class and, for the discipline test, may be developed in-house or purchased externally. In the case of readiness for self-directed learning we recommend the instrument developed by Giglielmino (1977). The second act is creating student learning outcomes (SLOs) based on Bloom's taxonomy for educational objectives (1956) as modified by Anderson and Krathwohl (2001) and Fink's taxonomy of significant learning (2003). A SLO is a measurable aspect of knowledge embedded in an academic program's goals and in a marketable competency-based skill set. Both the goals and the skill set are to be mastered through a variety of assessment activities and experiences. Bloom's modified taxonomy divides the learning process into two distinct levels, lower-order learning objectives and higher-order learning objectives as indicated in Table 1 below.

Table 1: Bloom's Modified Taxonomy

Lower Order Learning Objectives	Skills
Remembering	Recalling or retrieving specific definitions or formulae
Understanding	Explaining these definitions or formulae to another person
Applying	Solving simple applications of these definitions and formulae
Higher-Order Learning Objectives	
Analysing	Identifying the concepts needed to solve a problem
Evaluating	Justifying your selection of each concept; assessing alternatives
Creating	Developing a potential solution to a problem

This table identifies the lower-order learning objectives from Bloom's Modified Taxonomy for educational objectives and the skills associated with those objectives. It also identifies Bloom's higher-order learning objectives and the skills associated with those objectives.

For hierarchical disciplines - economics, mathematics for example, greater emphasis would be given to the lower-order learning objectives in the introductory courses with a gradual shift to the higher-order learning objectives as students move to the discipline's capstone course and/or experience. Unlike Bloom's modified taxonomy, Fink's taxonomy does not divided the learning process into two levels (explicitly); rather, it provides a holistic approach to a specific outcome - significant learning as indicated in Table 2 below.

The first three components of Fink's taxonomy are quite similar to the six components of Bloom's modified taxonomy and, implicitly, follow Bloom's two-fold division of the learning process. The second three components make explicit the idea that potential solutions to some problems come from thinking

holistically from outside a specific discipline's basic principles and worldview. Both taxonomies should be used in tandem to develop SLOs that are designed to guide students toward the goals of mastering critical thinking, of acquiring a personally rewarding and marketable competency-based skill set, and of becoming a self-directed learner. The third action that creates a structured learning environment is the assignment of structured assessment activities. These activities offer precise guidance and model how to solve problems, and provide opportunities for students to demonstrate mastery of the course's SLOs. SLOs associated with the lower-order learning objectives of Bloom's modified taxonomy and the first two components of Fink's taxonomy may be assessed using multiple-choice questions and simple computational problems. SLOs associated with the remaining aspects of each taxonomy may be assessed using essays, case studies and/or term projects with the proviso that students have been appraised of the rubric that will be used to assess their mastery of the SLOs associated with those activities (Loveland, 2005; Mansilla et al, 2009; Montgomery, 2000; Weimer, 2012). Finally, every reading assignment should be accompanied by (tied to) a structured writing assignment (Walvoord and Johnson-Anderson, 1995).

Table 2: Fink's Taxonomy of Significant Learning

Taxonomy Component	Skill
Fundamental Knowledge	Understanding and remembering information and ideas
Application	Skills, critical, and practical thinking; managing projects
Integration	Connecting ideas, people, realms of life
Human Dimension	Learning about one's self; others
Caring	Developing new feelings, interests, values
Learning How to Learn	Becoming a better student; inquiring about a subject, self-directed learning

This table delineates the six components of Fink's taxonomy of significant learning. Fink's taxonomy makes explicit the idea that potential solutions to some problems come from thinking holistically from outside a specific discipline's basic principles and worldview.

The fourth and final action to create a structured learning environment is post-testing. The two tests administered during the first week of the course are administered again during finals week. The difference between the pre-test score and the post-test score provide some evidence of the "value added." That is, by how much did the students' stock of knowledge and readiness for self-directed learning change as a result of the instruction they received, and the investment of their time, talent, and treasure in their progress of mastering critical thinking, of acquiring a personally rewarding and marketable competency-base skill set, and of becoming a self-directed learner.

Integrating Structured Learning Environment and Assurance of Learning

A structured learning environment focused on developing students' human capital in the discipline and skill of self-directed learning can be integrated with a quality control system that monitors students' performance on related SLOs. Such a system provides signals from students' work which indicates when intervention in the learning process is necessary to remediate shortcomings. Assurance of learning is one such quality control system. Assurance of learning is a process that permits the classroom teacher to demonstrate that his or her students have met the SLOs for the course.

The adoption, implementation and *continued use* of assurance of learning signals to clients/customers of the educational system - the organizations that employ the students and the communities of which they are participating members - that the system is serious about improving the quality of its graduates' human capital. These assurance of learning practices further benefit the three principal stakeholders in the educational process. Students may perceive that an increase in the quality of their human capital translates into better paying careers and more satisfying personal and community life. Potential employers may

perceive that prospective employees are better prepared and that may translate into better bottom lines. Finally, academic institutions and the disciplines located therein may perceive that investment in the assurance of learning process improves the institution's reputation. Improving students' human capital is a win-win-win situation for all three interested parties.

The process of measuring the degree to which students exceed, meet or do not meet the performance standard for each of the SLOs generates the data to be collected and analyzed. Without this continuous supply of accurate data, the criticisms of the current system of education - a perceived low quality of potential entry-level employees' skills - by the clients /customers of this system will not be addressed and resolved to the clients'/customers' satisfaction. Additional empirical evidence from outside the classroom in support of the win-win-win situation must also be forthcoming. This implies that data, such as post-graduation employment and initial salary one-year out, and the employment, promotions, and salary five years out, must be gathered and analyzed.

In addition, surveys of employers of the graduates' performance that allow employers to identify weakness in the students' preparation can be used to develop SLOs going forward. This type of information may also be gathered through informational conversations with, or through direct involvement of, community members on discipline specific advisory boards. The results should be made available to the organizations that employ the students, to the affected academic unit, and to the general public. This marshalling and distribution of the supporting empirical evidence is a standard practice of graduate programs, and, in particular, of MBA programs. Such practices could be modified by the affected academic unit to suit its specific needs. The following example draws of the authors' experience with a ten-step assurance of learning program as it has been applied to a specific course, Principles of Microeconomics, a required course for students with a declared major in the authors' college of business. The goal of having students master demand and supply analysis is the focus of this example presented in Table 3.

As noted above, assurance of learning is a quality control program designed to gather evidence on students' mastery of course specific SLOs. If the evidence gathered in this step of the assurance of learning process indicates that students have not mastered a course specific SLO, then intervention is required, and a two part remediation plan must be developed and implemented. An essential feature of the process is Step 8: Closing the loop (see Step 8 in Table 3 above) which identifies whether or not there is a need for remediation. Remember, a key goal of a structured learning environment based instruction and the ten-step assurance of learning program is on what knowledge students should master during the course and on what knowledge students should retain one year after the course; that is, mastering critical thinking, acquiring a personally rewarding and marketable competency-based skill set, and becoming a self-directed learner. However, if the initial evidence indicates that students have not mastered the SLO (the expectations set forth in Step 3 were not met), then intervention in the form of a two-part remediation plan is required. The first part consists of remediation exercises: additional explanations of the SLO to be mastered and additional practice sets. The second part is additional assessment to gather new evidence of potential students' mastery of the SLO in question.

Table 3: A Ten-Step Assurance of Learning Program with an Integrated Structured Learning Environment

Step	Example (Principles of Microeconomics)
Step 1: Translate each educational goal into a measurable SLO	Students will be able to solve problems dealing with lower-order learning objectives associated with the interrelationship among demand, supply and price elasticity of demand.
Step 2: Identify an appropriate assessment activity to measure the SLO in Step 1 above	Since the goal and its SLO are associated with the lower-order learning objectives of remembering, understanding, and applying a quiz using multiple-choice questions could be used to assess students' mastery.
Step 3: Establish the performance standard for each SLO	At least 70% of the students answer correctly at least 6 of 8 questions used to assess students' mastery of this SLO.
Step 4: Establish the performance categories for each SLO.	**Exceeds Expectations**: A student answered all eight questions correctly **Meets Expectations**: A student answered at least six questions but no more than seven questions correctly **Does Not Meet Expectations**: A student answered five or fewer questions correctly
Step 5: Identify the courses in which each SLO is to be measured	All sections of Principles of Microeconomics
Step 6: Identify who is to collect the data	The instructors who teach the identified sections of this course are responsible for gathering the data. These data are to be forwarded to the individual who is responsible for analyzing the data.
Step 7: Determine who is responsible for analyzing the data – comparing outcomes (the number of students in each performance category) to the level of satisfactory performance defined in Step 3 and reporting that analysis to each level from which the data were gathered (the sections, disciple and department) and the college and university, if appropriate.	This data set and an example of student work (name removed) in each performance category is given to the chairperson for analysis. The chairperson reports the results of the analysis to the instructor(s) who provided the data. A copy of the data set and representative work is retained by the instructor.
Step 8: Develop policies for closing the loop: What is the course of action if outcomes are greater than or equal to the expected level of satisfactory performance? What is the course of action if outcomes are less than the expected level of satisfactory performance?	If the initial evidence indicates that the goal and SLO have been met then several additional iterations with similar results must be obtained before you are completely satisfied…and you must gather additional downstream evidence to support your claim. Just because the goal and SLO were met in your class, this knowledge must be verified at other points in the curriculum. However, if the initial evidence indicates that students have not mastered the SLO (the expectations set forth in Step 3 were not met), then intervention in the form of a two-part remediation plan is required. The first part consists of remediation exercises: additional explanations of the SLO to be mastered and additional practice sets. The second part is additional assessment to gather new evidence of potential students' mastery of the SLO in question.
Step 9: Develop policies for integrating assurance of learning into the advising and curriculum processes	At the initial advising session home-grown or transfer students are informed of the existence of the assurance of learning process and its implications for the students. A brief explanation of the assurance of learning process should become part of the course syllabus and be explained to the students on the first day of class.
Step 10: Determine who will monitor the assurance of learning process	The Dean of the college is responsible for monitoring the assurance of learning plan because the Dean is able to oversee and influence the outcomes of the performance review and the reappointment, promotion and tenure processes. That is, the evaluation of the effectiveness of the assurance of learning process must be embedded in at least two faulty evaluation processes: performance review and retention, promotion and tenure.

This table provides a step-by step guide to implementing an integrated system of education using a structured learning environment and assurance of learning. An example of each step from the implementation of this system to a Principles of Microeconomics course is provided.

LIMITATIONS

We developed an integrated learning system based on the findings of our action research projects and classroom experiences within an Association to Advance Collegiate Schools of Business (AACSB) accredited college of business within a public, regional comprehensive university. Some of our experience may not translate to other settings. In addition, assurance of learning is required as part of our AACSB accreditation and thus faculty may be more willing to implement such a process than in other settings.

Areas for Future Research

Our proposal for integrating a structured learning environment with a process of assurance of learning results in the generation of data. Using these data, individuals could develop research programs to explore a variety of questions, such as: Does "value-added," the improvement between the pre-test results and the post-test results associated with the application of the discipline-based assessment activity, increase and is this increase due to our proposed treatment? Do the organizations that employ the students coming from the academic unit(s) that have implemented our proposed treatment perceive a difference in the quality of these potential employees in the dimensions that align with the SLOs?

CONCLUSION

In this paper we put forth a proposal to integrate a structured learning environment with assurance of learning to improve the quality of students' human capital. To that end we explored four topics: (1) criticism of the existing system of education, (2) evidence for action research projects that suggests the need for a structured learning environment for those students who are not ready for self-directed learning, (3) components of a structured learning environment, and (4) assurance of learning. We recommend, and provide a path for, integrating components of a structured learning environment and assurance of learning. We further suggested that prospective employers, students, disciplines and faculty could reap net benefits from implementing this proposal. Students may perceive that an increase in the quality of their human capital translates into better paying careers and more satisfying personal and community life. Potential employers may perceive that prospective employees are better prepared and that may translate into better bottom lines. Finally, academic institutions and the disciplines located therein may perceive that investment in the assurance of learning process translates into better reputations. Improving students' human capital is a win-win-win situation for all three interested parties.

APPENDIX

An example of AOL assessment for Principles of Microeconomics

The below multiple-choice questions used to assess students' mastery of the following goal and SLO would comprise one portion of a larger assessment activity:

> Goal: Demand and supply analysis
> SLO: Students will be able to solve problems dealing with lower-order learning objectives associated with the interrelationship among demand, supply and price elasticity of demand.

Sample Questions

The definition of price elasticity of demand is captured best by which of the following:

> A.   The change in quantity demanded divided by the change in price

B.   The change in price divided by the change in quantity demanded
C.   The percentage change in the quantity demanded divided by the percentage change in the
       price
D.   The percentage change in the price divided by the percentage change in the quantity
       demanded

If demand is elastic and quantity demanded declines by 3% then price must

A. Decrease by 3%
B. Increase by 3%
C. Increase by less than 3%
D. Decrease by more than 3%

Questions 3-4 are based on the following information. The original price is $5 and the original quantity is 100 units. After an increase in the number of sellers the new price is $4 and the new quantity is 115 units.

Demand is _____. (Use the total revenue test.)

A. Elastic
B. Inelastic
C. Unit elastic
D. Indeterminate

As a result of the increase in the number of sellers

A. Demand and quantity supplied increased.
B. Supply and quantity demanded increased.
C. Supply increased and quantity demanded decreased.
D. Demand increased and quantity supplied decreased.

If the prices of resources increased, then the market price would

A. Decrease as would quantity supplied.
B. Decrease as would quantity demanded.
C. Increase but quantity supplied would decrease.
D. Increase but supply would decrease.

If demand is inelastic and the state government increased the tax on cigarettes total revenue would

A. Decrease as would quantity demanded.
B. Decrease as would quantity supplied.
C. Increase but quantity supplied would decrease.
D. Increase but quantity demanded would decrease.

If buyers' incomes decrease then the market price would

A. Increase as would quantity supplied.
B. Increase as would quantity demanded.
C. Decrease but quantity demanded would decrease.
D. Decrease but quantity supplied would decrease.

If the number of buyers increase then the market supply curve would

A. Shift to the right.
B. Shift to the left.
C. Remain constant.
D. Become more elastic.

Answer Key

Q1: C; Q2: C; Q3: B; Q4: B; Q5: D; Q6: D; Q7: D; Q8: C
Performance standard for the SLO: At least 70% of the students answer correctly at least 6 of 8 questions used to assess students' mastery of this SLO.

Q1: 70% of the students responded correctly to this question

Q2: 90%
Q3: 50%*
Q4: 93%
Q5: 84%
Q6: 90%
Q7: 72%
Q8: 50%*

*Note: Even though the performance standard for this SLO was met more data must be gathered and additional work must be done to improve instruction and student performance on Q3 and Q8.

Performance categories for the SLO:

Exceeds: A student answered all eight questions correctly; 10 students

Meets: A student answered at least six questions but no more than seven questions correctly; 80 students

Does not meet: A student answered five or less questions correctly; 15 students

Remember, since the eight multiple-choice questions are one portion of a larger assessment activity, even if a student meets or exceeds expectations for this portion of the AOL process, the grade earned by the student is a function of all the assessment activities associated with the course.

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