CORRECTNESS AND CONFIDENCE: TWO DIMENSIONS FOR MEASURING USABLE KNOWLEDGE

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ABSTRACT

Higher education assurance of learning techniques should be designed to assess whether lessons learned produce usable knowledge. While knowledge is often defined as "justified" information, it is the limiting of knowledge assessment to "correctness of answers" that is problematic in the development of complete learning assessment (Hunt and Furustig 1989). The purpose of this study is to introduce to the marketing educator's discussion the notion of assessing the usability of knowledge based on correctness with the addition of an expression of confidence of answers selected. Herein, the results of a preliminary study illustrate how such an evaluation provides greater understanding.

BACKGROUND

An in depth reading of Hunt and Furustig (1989), seems to suggest that real-life decision-making and practicality generally defines how certain and knowledgeable a student one needs to be. However, in assessing the relationship between learning and knowledge in academic settings, it is important that marketing educators not only have metrics available to assist in the diagnosis of student outcomes, the efficacy of instructional techniques, but also the predictability of graduates to create value for the employment community. Multi-dimensional needs require multi-dimensional analyses. These two, often opposing influences (practical and academic) suggests that educators explore approaches to assess knowledge, which capture some usability criteria.

This paper explores a little used knowledge assessment procedure that provides a better understanding of student's usable knowledge as measured by both the correctness of answers selected and the confidence expressed regarding answers selected in an academic setting. The author will introduce a process and a model for such an assessment and will report on preliminary findings and implications.

For several decades it has been argued that a necessary, but not sufficient condition of knowing something is that the person "in-the-know" must have confidence about that which is known (Ayer 1958; hunt and Furustig 1989). Further, it is argued that confidence influences the level to which an individual can effectively and efficiently use their knowledge at any given moment. As Quine (1987) said, the ability to measure whether an individual's belief (response) can be considered knowledge is a "boundary" issue. Specifically, it is in understanding where the boundary exists between being certain and not being certain; expressing usable knowledge or guessing, without limiting the assessment to merely a practical outcome of being correct or incorrect with the belief (response).

KNOWLEDGE AND CONFIDENCE

Sveiby (1997, p. 37) defines knowledge as "a capacity to act." Accordingly the intangibility and invisibility characteristic of the "capacity" aspect of knowledge makes understanding even more important. When considering marketing students becoming critical thinking professionals the primary interest should be to teach and thereby develop individuals with the usable knowledge that will permit them to succeed in a highly competitive global economy. This analytical capability supports the benefit of measuring usable knowledge; a combination of correctness and confidence in assurance of learning outcomes.

Further, when considering knowledge it must be understood that at some level knowledge is relative and there is some practical and academic value in a student being technically incorrect, especially if there is some systematic process that provides insight into the otherwise inaccurate answer: the usability of the knowledge. For the purpose of this study usable knowledge will be defined in accordance with Hunt and Furustig (1989) as "...beliefs that are correct and confidently justified." This definition also fits well in the evaluation of marketing students' performance.

MEASURING USABLE KNOWLEDGE

Armed with the general understanding of the conditions of usable knowledge, it is important to develop the concept of certainty.

Quine (1987) stated:

"Knowledge connotes certainty (but) what shall we count as certain? Knowledge applies only to true beliefs, and only to pretty firm ones, but just how firm or certain they have to be is the question."

To include certainty into the assessment of knowledge requires educators to consider the confidence of the responder in at least as great a degree as one would assess the correctness of the student to the tested item.

Using simple one-dimensional logic, if the instructor observes an incorrect answer the interpretation is that the person does not know the answer or is "uninformed." Such an inference does not necessarily portray a complete or accurate assessment of the student's knowledge. In the overall assessment of knowledge, the question must also be asked and answered: "If that student is extremely sure and still selects the incorrect answer is that individual uninformed, misinformed, guessing, or just plain wrong?" The interpretation that a correct response selected on a multiple-choice test accurately reflects knowledge does not provide a complete understanding, and does not provide any beneficial analysis of the implications surrounding the specific teaching process.

In order to make a more complete assessment of the usability of the knowledge available to the student, some level of confidence with selected responses must be made. Hunt and Furustig (1989) provided a model to illustrate the relationship among the correctness of a student's knowledge and the confidence with which the student believes the knowledge to be correct; ergo the usability of the knowledge (refer to Figure 1).
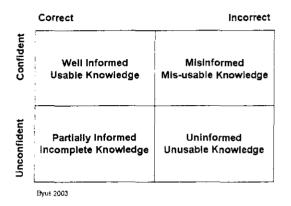
FIGURE 1

Criterion: Make Selection from Available Choices		
Knowledge expressed as choice. "A"		Knowledge expressed as choice. "B"
Correct Response		Incorrect Response
Certain of Response Correctness	Uncertain of Responses Correctness	Certain of Response Correctness
Usable Knowledge	Unusable Knowledge	Usable Knowledge
Informed (to some level)	Uninformed	Misinformed

Hunt and Furustig 1999

As illustrated, the inclusion of "usable knowledge" and the notions of an individual being informed (to

some extent), uninformed, or misinformed provides more depth to assessing the usability of knowledge. In a simpler sense, the Hunt and Furustig (1989) model can be reduced to a matrix that provides a more practical diagnostic tool (refer to Figure).

FIGURE 2

	Correct	Incorrect
Confident	Well Informed Usable Knowledge	Misinformed Mis-usable Knowledge
Unconfident	Partially Informed Incomplete Knowledge	Uninformed Unusable Knowledge

Byus 2003

The Byus 2003 model suggests that being confident or unconfident with either correct or incorrect responses produces a set of four distinct levels of usable knowledge as well as four distinct teaching and learning strategy possibilities. Firstly, if the marketing student is correct and confident it is reasonable to assume that the student is well informed and that a successful teaching and learning exchange has been accomplished. Secondly, if the student is correct but unconfident, it is reasonable to assume the teaching and learning exchange has produced partial information and incomplete knowledge that may require additional emphasis or remedial attention to secure greater student confidence. Thirdly, a student providing an incorrect response and is unconfident with the response produces a situation that suggests that the student is completely uninformed and that the level of knowledge possessed is "unusable". In this case, the teaching and learning exchange has broken-down. Specific actions, on the part of the student and the instructor must be undertaken in order to facilitate a new and successful knowledge creation model. Finally, there is the case of the student providing an incorrect response while being confident of the correctness of the response. In this situation, the student is misinformed. Misinformation, like partial information may only require remediation or reconsideration in order to create more usability of the information. Unfortunately mis-usable information may also be an indication of a more difficult problem wherein the student must be made to see that their belief

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structure regarding the subject matter may in-fact be flawed.

PRELIMINARY STUDY

Herein, the author reports the preliminary results of on-going research. The sample reported consists of undergraduates (55) enrolled in Principles of Marketing course and graduate (MBA) students (23) enrolled in a principles-type leveling course, during the Fall 2003 semester. While small, the sample provides surprisingly significant insights into analyzing the relationship of correctness and confidence with the goal being to determine the usability of student knowledge.

A basic assumption used with this sample is that all students enrolled in a principles course, regardless of their graduation status, would possess a similar amount of specific academic marketing knowledge. This assumption is made with the acknowledgement that perhaps certain undergraduate students would be repeating the course, or that individual graduate students may have been exposed to some on-the-job marketing training. There also exists a possibility that some students may have been enrolled in other business courses that may have included a marketing module.

Each of the two classifications of students (two separate classes) had a 25 question multiple-choice "Evaluation" test administered as the first event of the first session of the Fall 2003 semester. Students were instructed to provide two responses to each of the 25 questions. The first response requested a specific, direct-answer to the marketing subject addressed in the test, and the second response requested the student to indicate level of "sureness" (confidence) with the direct-answer selected on the marketing issue portion of the question. As an example:

Marketing Question: Reseller markets consist mainly of:
a) Industrial users.
b) Retailers.
c) Wholesalers and retailers.
d) Manufacturers.
e) Consumers.

Confidence Measure: On the question above, how sure are you of your answer?
a)   Not sure at all.
b)   Very unsure.
c)   Somewhat sure.
d)   Very sure.
e)   Extremely sure.

Further, the students were given exactly 30 minutes to complete the test with no ability to converse among each other or to consult any text or note set. While this limited time frame might encourage "guessing," students were instructed to answer as accurately as possible both questions associated with each marketing issue specified on the test. The written instructions provided were:

> Your score will be the number of items you mark (correctly or incorrectly) and which accurately express your level of sureness about minus the number of items you mark (correctly or incorrectly) and inaccurately express your level of sureness about.

> This scoring method does not penalize you for being incorrect, if you are truly "UNSURE" about your answer; however, if you are incorrect and "SURE" of your answer or your are correct and "UNSURE" of your answer your response will be considered a guess and will not count.

> Therefore, it is important that you answer questions both as correctly as possible and that you accurately assess your level of "SURENESS" with your answer.

The rationale for these instructions is to promote honest assessment. This statement is in keeping with the notion that students, honestly assessing both their knowledge and their level of certainty with their knowledge may in-fact provide the educator with valid information about the student's information and usability of knowledge learned. The specific language used in the instructions was intended to thwart haphazard marking of either question answers or levels of confidence/ sureness. However, it is reasonable to assume that there exists an element of guesswork and/or a lack of student compliance/ cooperation in all multiple-choice tests.

RESULTS

Because the students by and large were new to the academic specificity of marketing, it was anticipated that average correctness to the marketing issue questions would be low; scores ranged from 12 percent to 72 percent with the average score being 49.32 percent. This scoring tended to support the author's belief that students in the sample were, on average, not in possession of a substantial amount of marketing specific knowledge.

The data also illustrates that both classifications appear to be fairly unconfident with their responses, with the mean confidence scores of responses computed to be 1.66. The scale used was scored as 0 = "Not sure at all", 1 = "Very Unsure", 2 = "Somewhat Sure", 3 = "Very Sure" and 4 = "Extremely Sure". This low level of student confidence also supported the author's

initial impression that students would, at this early stage of instruction, be relatively unconfident with their responses.

The reliability of the five-point "Likert" confidence scale was computed to be an extremely high .9269, using the Cronbach Alpha coefficient of reliability. A split-half test of reliability produced an equally impressive set of reliability coefficients at .878 for 13 items and .864 for the remaining 12 items. The correlation between the two forms was computed to be a highly respectable .801.

Analysis of this preliminary data indicates that while graduate students were more "correct" with their responses, they expressed less "confidence" than the undergraduate student. This may suggest that while both groups do not possess a substantial amount of "correct" marketing specific knowledge, the more mature student may be more openly inclined to acknowledge their lack of confidence. It has often been stated that there may be wisdom and caution associated with age and impetuousness associated with youth.

Analysis of the data indicates that student correctness scores were fairly normally distributed regardless of classification. Such distributional characteristics help the instructor to understand the extent of correctness/incorrectness within a student population.

As previously indicated, average confidence scores ranged from 0 (Not Sure At All) to 2.92, with a mean score of 1.66, which indicates that on-average students were just less than "Somewhat Sure" on the marketing specific questions. In addition and similar to the correctness index, the students' confidence index scores also were fairly normally distributed within the sample.

The results of the students' usability of information and knowledge as a function of correctness and certainty of responses shows that approximately 13.5 percent of responses selected by students were the result of students being both "Correct and Confident," (usable knowledge). About 37 percent of student responses are categorized as being "Correct yet Unconfident" which suggests that a substantial portion of the responses are the product of partial information and must be categorized as incomplete knowledge.

The preliminary results show that slightly more than 41.5 percent of responses selected by the students were "Incorrect and Unconfident" which implies that a substantial number of responses could be considered as being the product of students being uninformed possessing unusable knowledge. Finally, the results show that slightly more that 7 percent of student responses illustrate the characteristics of being the product of misinformation (Incorrect but Confident), examples of misusable knowledge. While generally benign, such misusable knowledge can distract and confuse both the student in their pursuit of usable knowledge and the instructor in the pursuit of establishing solid understanding of marketing.

DISCUSSION

There are substantially more questions that must be examined in the context of the "correctness and confidence" concept. This discussion paper is an introduction and overview of the information provided by such an analysis, both for internal and external assessment purposes. As illustrated, marketing students and instructors can benefit from assessment techniques that evaluate the correctness of responses provided and the student's level of confidence with selected responses. For today's marketing educator, the ability to diagnose both the extent of students' knowledge and the extent of their confidence provides substantial potential for improving future marketers with curriculum that promotes higher levels of correctness and greater levels of confidence.

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