

Business Literacy: A Millennium Assessment in the Manufacturing Environment

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Abstract

This paper presents the results of a business literacy survey administered to 335 heating, ventilating, and air conditioning (HVAC) manufacturing employees located in four states at the turn of the millennium. A 72 item, true/false business knowledge questionnaire containing an approximate equal number of basic economics, marketing, and finance items was developed and administered on an overhead projected and researcher read basis. Results indicated that overall business literacy in the manufacturing sector is greater than executives and trainers might initially assume with general or aggregate business literacy approaching 70%. Marketing and economics literacy was strongest with significantly lower financial literacy indicated. Significant differences between manufacturing employee business literacy scores were identified for six of the seven common employee characteristics and demographic variables tested.

Introduction

As the need for an increasingly well-trained and “literate” work force expands beyond the basic 3R’s, the need for basic business literacy at all levels of the workforce becomes more apparent. Much of private industry has begun this task, but opinions vary in the business literacy literature as well as in industry as to the present level of employee business literacy. As such, the purpose of this paper was to identify the level of business literacy present in manufacturing employees at the close of the millennium as an important business literacy training benchmark, with business literacy measured at the general, economics, marketing, and finance levels.

This study provides an initial basis for improved business literacy efforts and further identifies a reasonably literate manufacturing workforce in a general business literacy sense. The implications of the level, type, and focus of improved business literacy training are discussed. The following contents present specific research methodology and paper sections relative to literature review, methodology, sample design, questionnaire design, survey administration, data analysis, results, and conclusions and implications as major study components:

Business Literacy Literature Review

American businesses are challenged to produce more output with less input as globalization produces a more competitive economic environment. According to the *Policy Studies Journal*, there has been a movement to restructure the educational system

in order to respond to this “workforce crisis” by providing more qualified workers for businesses, therefore “improving economic competitiveness and productivity” (Paris, 1994). The Direct Marketing Association Agencies Council committee has also addressed this “skills shortage” as a serious problem in business that negatively affects the quality of service delivered (Gray, 1999). *Business Week* has identified growing illiteracy in the workplace as a “time bomb” based on the results of a study that “raises troubling questions about the country’s human capital” (Bernstein, 2002). *Nation’s Business* reports, “an expanding U.S. economy and a correspondingly low unemployment rate have created a powerful demand for intelligent, well-trained workers” (Bates, 1998). With one of the nation’s employment and competitive problems identified as a shortage of skilled workers, reducing workforce knowledge deficiencies may require increased workforce training. This may be especially true relative to workforce business literacy.

The history of workforce business literacy may provide a better understanding of the level of business literacy improvement required. Business literacy is defined by Berman (1998) to mean “the ability to speak and read the language of business”. The language of business has traditionally included the functional areas of economics, marketing and finance. Business literate employees are additionally defined by Muir (2002) to mean “employees with the ability to use financial and business information to understand and make business decisions”. Opinion Research Corporation has been tracking the economics knowledge of the general public for over 50 years as the broadest measure of business literacy. “In 1945, the American public estimated that manufacturers made 18 cents after taxes on each dollar of sales; the actual figure was seven cents” compared with the “estimate in 1986 of the after tax profit per dollar of sales of 32 cents while the actual was four cents” (Lee, 1991). In 1945, the general public estimate of profitability was almost three times higher than actual manufacturing profit and in 1986 the general public estimate was eight times higher than actual manufacturing profit reflecting widening disparity over time between the perceived and actual level of manufacturing profitability. Similarly, overestimates of return on investment were also documented. While the number of college degrees rose substantially during that same time period, basic knowledge of profitability declined sharply.

The educational system and in particular universities have historically been criticized for this decrease in business literacy. The Institute of Management Accountants cites, “preoccupation of most universities with research” as a cause for the “declining quality of business and accounting education” (Usry, 1993). Universities earn prestige and additional funding for their research efforts, resulting in professors concentrating on research and delegating teaching undergraduate courses to graduate students. From a budgeting perspective, this strategy may be appealing, but the IMA is challenging universities to balance their research functions with teaching (Usry, 1993).

Some businesses have confronted this problem by successfully implementing training programs to increase employee skills. The *Personnel Journal* explains how Springfield Manufacturing increased profits by 15% by training their employees to apply the financial principles to their individual task (Anfuso, 1995). However, *InfoWorld* reports the plight of other companies struggling through training programs designed to teach business skills where employees, learning a spreadsheet program, will ask what percentages are (Lewis, 1997). Although some companies enjoy a great deal of success with training programs, a greater number of companies experience poor results for their training efforts. As an example, *Inc.* has noted that the typical “job training program

provides a set of skills guaranteed to become obsolete a few years after they are taught” and instead recommends business training that teaches “people the financial skills necessary to understand how a company creates value and makes money” (Gendron, 1993). The fundamental tools of business: income statements and balance sheets, target markets and product life cycles, the laws of supply and demand, are identified as timeless principles necessary to understand the operation of any business.

Training and Development has advocated the business literacy of employees and has concluded that “...companies that conduct business literacy training have found that employees of all backgrounds and education levels can learn and are interested in learning about the numbers” (Berman, 1998). A review of the current business literacy literature failed to identify any studies which identified employee characteristics or demographics associated with different levels of employee business literacy. It is imperative for the United States to develop a business literate workforce in order to remain competitive in the global economy. To this end, it is further imperative that an assessment of the existing level and nature of business literacy in the workplace be undertaken as a business literacy training benchmark.

Research Methodology

Based upon the assumption that a baseline assessment of manufacturing employees business literacy was important as a business literacy training benchmark, an exploratory and descriptive research methodology was constructed to: (1) initially identify surveyed manufacturing employees’ breadth and depth of existing business literacy relative to 72 business knowledge questions and (2) profile this level of business literacy relative to primary economics, marketing, and finance components. The questionnaire additionally included 46 business subject categories and an open-ended question to further identify the business subjects the respondents were most interested in learning more about. In general the research methodology may be summarized as a dichotomous closed end, proportionate stratified, and surveyor administered questionnaire survey.

A test for significant differences between correct responses by question type (marketing, economics, and finance) was performed. A rank order of correct responses to business knowledge questions is provided in addition to a rank order of identified business subjects of further interest. A test for significant differences in business literacy scores by respondent characteristics and demographics was additionally performed using t-tests and ANOVA and further assuming null hypotheses.

Sample Design

Based upon a target population of all manufacturing employees, the working population was identified as the manufacturing employees of a large air conditioning manufacturing corporation in geographically diverse plants to include Clarksville, TN; Tyler, TX; Trenton, NJ and Vidalia, GA.

A proportionate stratified random sample of employees from this working population to represent a minimum of 5% of each plant was produced relative to estimated response rate. Only the first two shifts of each identified plant were sampled due to small and unstable third shift size. A random number generator and systematic interval were utilized to produce a minimum 5 percent representation from each plant

from each proportionately stratified category to include gender, shift, hourly/salaried, and geographic area considerations. The net useable sample size of 335 produced an initial and estimated maximum standard error of the percentage estimate for all questionnaire items of +/- 5.4 percent at a 95 percent confidence level.

Questionnaire Design

An employee respondent and researcher administered anonymous questionnaire using a Scantron answer card was utilized to gather and record existing employee business knowledge data. Estimated time for data collection per shift was thirty-five minutes to include introduction, directions, administration, and collection of materials.

All questionnaire items and sections were originally constructed using input from manufacturing executive level focus groups and prior researcher business subject and research knowledge. The initial questionnaire was pretested in multiple junior level business classes to establish content validity and item reliability. As a result, the final questionnaire contained five sections to include (1) introduction and directions; (2) seventy-two True/False Business Knowledge items; (3) a multi-item (forty-six) business knowledge interest question; (4) an open-ended business knowledge interest question; (5) a demographic section measuring common employee characteristics to include employment classification (hourly/salaried), gender (male/female), shift (1st/2nd), years of company employment, age, education and geographic location (North/South).

Survey Administration

The design of the survey administration was relatively unique to the business literacy literature, and as a researcher administered format, reflected a compromise between a personal interview and self-report structure. In effect, when the respondents were assembled at the designated time and place, all items on the questionnaire were read (to include introduction and directions) with the employee respondents recording their answers on the appropriate Scantron or questionnaire form. An overhead transparency display of all questions was additionally used for question and response clarity. The “hybrid” personal interview and self report structure was used to eliminate reading level and reading speed bias in support of common question item interpretation and questionnaire completion. Questions were allowed of respondents in the survey administration to further support common question item interpretation. At completion, the survey administrators collected all questionnaires and response forms “simultaneously” to support respondent anonymity and overall response rate.

Survey administration and data collection occurred during May of 2000 and was completed by May 26, 2000. Only fully completed questionnaires were considered “usable” and included in the data analysis. The open-ended business knowledge interest item was hand edited and coded by the three researchers with majority interpretation used.

Data Analysis and Hypotheses

Analysis of data included the following general profiles and tables as follows:

1. Rank order distributions of business literacy questionnaire item responses from highest to lowest percentage correct score (Table 1).

2. Rank order distribution of business interest items from highest to lowest (Table 2).

Specific null hypotheses for data analysis are tested at the .05 level of significance as follows:

1. At the .05 level, there is no significant difference between correct business literacy scores by economics, marketing, and finance question types. The standard error of the percentage was used for this calculation.
2. At the .05 level, there is no significant difference between correct business literacy scores by employment classification (hourly vs. salaried).
3. At the .05 level, there is no significant difference between correct business literacy scores by gender (male vs. female).
4. At the .05 level, there is no significant difference between correct business literacy scores by employee shift worked (1st vs. 2nd).
5. At the .05 level, there is no significant difference between correct business literacy scores by years of company employment.
6. At the .05 level, there is no significant difference between correct business literacy scores by age.
7. At the .05 level, there is no significant difference between correct business literacy scores by level of education.
8. At the .05 level, there is no significant difference between correct business literacy scores by geographic location of present employment.

A t-test assuming unequal variances was employed for the dichotomous variables (hypotheses two through four) and a one-way ANOVA also assuming unequal variances was employed for the multichotomous variables (hypotheses five through eight).

Results

The study produced 335 useable responses from an attempted distribution of 390 questionnaires for a net useable response rate of 86%. Responses remained proportionate to initial stratified sample to include initial gender, shift, hourly/salaried, and geographic area considerations.

Table 1 presents the results of the rank order distribution of all 72 business literacy questionnaire responses from highest to lowest percentage correct score. Global results indicate a mean overall correct percentage response of 69.7 percent, a median of 69.4 percent, and a mode of 68.1 percent producing a nearly perfect normal distribution and a calculated standard error of the percentage of .47 percent. The percentage of correct scores for all 335 respondents ranged from a low of 42 percent to a high of 92 percent. The percentage of correct scores varied by question type such that marketing averaged 73.7 percent, economics averaged 71.8 percent and finance averaged 61.7 percent.

Table 1
BUSINESS KNOWLEDGE SURVEY RANK ORDER RESPONSES
(X = 69.7%)

Rank	% Correct	Question
1.	97.6%	Competition occurs when more than one firm can meet market needs.
2.	96.3%	A budget can be <u>both</u> a planning tool and a control tool.
3.	96.2%	A positive attitude toward a brand will generally lead to more frequent purchase of that brand.
4.	94.9%	The first step in marketing should be the identification of customer needs.
5.	94.7%	A market exists whenever there is a willing buyer and a willing seller.
6.	93.4%	A 30-year mortgage is a long term liability.
7.	91.5%	The primary purpose of a business should be to provide customer satisfaction.
8.	89.6%	The group of people a product is to be sold to is the target market.
9.	89.5%	Domestic success <u>does not</u> guarantee international success.
10.	87.3%	A commitment to compete internationally is necessary to be successful internationally.
11.	87.2%	Most products produced in the U.S. compete with similar products produced around the world.
12.	85.6%	As prices <u>increase</u> , people tend to buy <u>more</u> .
13.	84.8%	The <u>increased</u> free trade of products across national boundaries is an example of globalization.
14.	84.8%	Increased productivity will generally lead to increased profits.
15.	84.7%	Interest should be considered the cost of money.
16.	84.5%	Lowering price is often used to <u>increase</u> market share.
17.	83.9%	Primary distribution costs are transportation and storage.
18.	82.3%	Materials are an example of a variable cost.
19.	81.9%	Products have life cycles and are introduced, grow, mature, and decline.
20.	81.6%	In general, the greater the recognition of a brand name, the greater the value of that brand name.
21.	81.1%	There is no relationship between interest rates and business risk.
22.	81.0%	A monopoly exists when one firm controls their market.
23.	80.9%	Gross domestic product (GDP) is a measure of economic activity.
24.	80.5%	Productivity is generally measured by output divided by input.
25.	80.1%	Inventory reduction is a source of cash.
26.	78.5%	Market share is calculated as company sales divided by total industry sales.
27.	78.4%	A business must grow or die.
28.	77.2%	Total costs equal fixed costs plus variable costs.
29.	76.5%	The consumer price index (CPI) is an indicator of inflation.
30.	76.5%	Holding a diversified portfolio of investments reduces risk.
31.	75.8%	Business investment decisions are affected by tax rates.
33.	75.4%	Determining that people > 35 have needs different than those < 25 is an example of segmentation.

34. **74.9%** *The higher the risk, the higher the expected return.*
35. **74.5%** *Markets generally remain stable over time.*
36. **74.4%** *The relationship between a product, markets, and its competitors is known as positioning.*
37. **74.1%** *The Federal Reserve has raised interest rates more than once recently.*
38. **73.8%** *Nobody ever won an argument with a customer.*
39. **73.7%** *Value is the same as price.*
40. **73.2%** *In distribution, you can eliminate the middleman but not their function.*
41. **71.9%** *The 20-year average annual return of the Standard and Poor's stock market is 20%.*
42. **71.6%** *The market determines the price of the product.*
54. **69.4%** *A service is an intangible product.*
55. **69.3%** *The U.S. inflation rate last year was 6%.*
56. **68.4%** *Profit is the reward for taking business risk.*
57. **68.1%** *Fixed costs generally do not increase with volume.*
58. **65.5%** *Advertising can generally overcome a poor product, a poor price, or poor distribution.*
59. **64.6%** *An increase in interest rates causes the price of stocks to decrease.*
60. **64.1%** *The U. S. trade deficit last year was the highest in U. S. history.*
61. **63.5%** *Value is generally measured as quality divided by price.*
62. **60.8%** *Long run stock returns are greater than long run bond returns.*
63. **59.6%** *A dollar today is worth more than a dollar to be received tomorrow.*
64. **59.6%** *Inflation may be defined as too many dollars chasing too few goods.*
65. **58.8%** *Total assets equals total liabilities plus equity.*
66. **58.5%** *An increase in accounts receivable is a use of cash.*
67. **57.3%** *Inventory is a fixed asset.*
68. **55.0%** *The top corporate tax rate is 33%.*
69. **54.7%** *Federal government fiscal policy deals with and the money supply.*
70. **52.5%** *When demand is greater than supply, it is a buyers market .*
71. **52.0%** *Accounts receivable would generally be a current liability.*
72. **51.5%** *Accounts payable is a current asset.*
73. **50.7%** *Depreciation is a cash expense*
74. **47.1%** *Nothing happens until someone sells something.*
75. **47.0%** *The average age in the U. S. is an example of demographics.*
76. **46.3%** *Tariff barriers are the best way to protect domestic markets.*
77. **42.8%** *A product must be physically changed for it to be called a new or different product.*
78. **42.7%** *Average profit after taxes in manufacturing is less than 10% of sales.*
79. **40.8%** *Profit is the same thing as cash.*
80. **38.7%** *All businesses run on cash.*
81. **34.8%** *Marketing is basically the same thing as selling.*
82. **34.3%** *Working capital equals total assets minus total liabilities.*
83. **32.2%** *Federal government monetary policy deals with taxes.*
84. **25.1%** *Sales minus cost of goods sold equal net profit.*

Manufacturing employees' knowledge of finance was significantly lower than the global study average of 69.7 percent and also significantly lower than their knowledge of marketing and economics subjects employing the calculated standard error of the

percentage of .47 percent and a calculated confidence interval of .92 percent (1.96 times .47 percent). As such, null hypothesis one was rejected at the .05 level of significance.

Table 2 presents the results of the rank order distribution of the 55 business interest questionnaire responses from highest to lowest selection score (total sum of expressed interest). A reasonable rank order break occurs at 55 requests producing 16 business topics that the manufacturing employees were most interested in. Sixty-two percent of the respondents indicated a strong interest in further stock market information as the business category of most interest. Additional top 16 requests for further business information, in rank order, were marketing, market share, budgeting, economic systems, interest rates, profit, taxes, risk and return, cash flow, competition, international business, customer service, globalization, operating expenses, and uses of cash. The majority (nine out of sixteen) of the business subjects for which further interest was expressed were classified as financial. The significantly lower scores on finance questions support this interest in additional financial information and therefore points to an obvious business literacy training need. The open-ended business knowledge interest question produced responses primarily related to interest in small business and entrepreneurship subjects.

**Table 2
BUSINESS INTEREST RANK ORDER RESPONSES**

<u>Interest Areas</u>	<u>Total Requests</u>	<u>Interest Areas</u>	<u>Total Requests</u>
Stock Market	216	Pricing	36
Marketing	94	Product Life Cycles	35
Market Share	90	Demographics	33
Budgeting	87	Distribution	31
Economic Systems	87	Productivity	30
Interest Rates	83	Assets	30
Profit	81	Working Capital	29
Taxes	78	Product Line/Mix	27
Risk and Return	74	Value	27
Cash Flow	69	Brand Name	25
Competition	68	Trade	25
International Business	66	Cost of Goods Sold	24
Customer Service	63	Depreciation	24
Globalization	59	Interest	23
Operating Expenses	58	Positioning	23
Uses of Cash	55	Income Statements	22
Consumer Behavior	47	Price/Quantity	19
Customer Service	46	Margin	18
Sales Promotion	45	Balance Sheet	17
Time Value of Money	43	Liabilities	17
Production Costs	43	Segmentation	8
Inflation	38	Differentiation	4
Sources of Cash	36		

Table 3 presents the results of the tests for significant differences between business literacy scores by hourly/salaried, gender, shift, years of company employment, age, education, and employment location considerations. Significant differences between respondent business literacy scores were identified relative to employment classification, gender, shift, years of company employment, level of education, and geographic location of present employment. As such, null hypotheses two through five and seven and eight were rejected at the .05 level of significance with age being the only demographic variable not significantly associated with correct business literacy scores.

Table 3
RESPONDENT BUSINESS LITERACY SCORES BY DEMOGRAPHICS

1. Employment Status	Mean	N	t – Value	Significance
Salaried	.735	98	10.636	p < .0001
Hourly	.652	237		
2. Sex	Mean	N	t – Value	Significance
Male	.687	240	4.417	p < .0001
Female	.649	95		
3. Shift	Mean	N	t – Value	Significance
First	.685	232	3.586	p < .001
Second	.655	103		
4. Years with Employer	Mean	N	F – Value	Significance
< 5	.670	114	2.718	p < .05
5-9	.659	62		
10-14	.690	32		
15-20	.706	39		
> 20	.678	88		
5. Age	Mean	N	F – Value	Significance
18-25	.657	34	1.254	.288
26-35	.667	87		
36-45	.684	32		
46-55	.683	39		
GT 55	.674	88		
6. Education	Mean	N	F – Value	Significance
< H.S.	.641	11	24.430	p < .0001
H.S. Graduate	.642	100		
Some College	.669	121		
College Graduate	.731	74		
Graduate School	.674	29		
7. Location	Mean	N	F – Value	Significance
Clarksville	.690	92	9.88	p < .0001
Tyler	.653	101		
Trenton	.696	110		
Vidalia	.639	32		

Conclusions and Implications

The survey methodology, which employed a geographically diverse and proportionately stratified sample relative to gender, shift, and hourly/salaried status in the air conditioning manufacturing sector can reasonably be considered representative of the general manufacturing industry and general business literacy environment. The researcher administered (read and visually presented) dichotomous multi-item questionnaire supported convergent and divergent validity. The 86 percent net useable response rate was robust and absent of significant non-response bias with further significant predictive validity present.

As a comprehensive assessment of business literacy in the manufacturing environment, a number of important conclusions can be drawn as follows:

1. General business literacy in the manufacturing sector is greater than executives and trainers might initially assume with general or comprehensive business literacy approaching 70 percent. The implications for business practitioners and trainers are such that a reasonable base of business literacy exists which can be built upon and improved through targeted business literacy training.
2. Marketing and economics business literacy is strongest in the manufacturing sector with significantly lower finance literacy indicated. The implications for business practitioners and trainers are such that business literacy training should reasonably focus upon the identified financial literacy deficiency to support any form of open book management culture.
3. Manufacturing employees indicate an expressed interest in further business knowledge relative to a number of summarized subjects to include the stock market, marketing, competition, budgeting, profit, taxes, risk and return, cash flow, interest rates, economic systems, international business, globalization, entrepreneurship, and customer service. The implications for business practitioners and trainers are such that business literacy training programs should reasonably focus upon these business topics as identified business subjects of high interest.
4. Significant differences between respondent correct business literacy scores were produced for six of the seven demographic variables specifically identified as employment classification, gender, shift, years of company employment, level of education, and geographic location of present employment. Manufacturing employees who were from more southern states, hourly, female, with shorter company employment, and with a lower level of formal education scored significantly lower relative to business literacy. The implications for business practitioners and trainers are such that this employee group and profile is the most in need of and might benefit the most from business literacy training.
5. Implications for researchers are such that levels of business literacy should be researched across broader employment categories to include the service industries in an attempt to identify current and potentially different levels of business literacy relative to industry or employment categories.

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