

“Design of assignments using the 21st century bloom’s revised taxonomy model for development of critical thinking skills”

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DESIGN OF ASSIGNMENTS USING THE 21ST CENTURY BLOOM'S REVISED TAXONOMY MODEL FOR DEVELOPMENT OF CRITICAL THINKING SKILLS

Abstract

Studies on the development of critical thinking skills with specific curriculum materials and instructional methods are few and have been highly theoretical and far removed from practical concerns and applications. This paper contributes to the existing literature on critical thinking pedagogy by providing examples of written assignments that are designed using the 21st century Bloom's taxonomy model to contribute to critical thinking development. The step-wise development of critical thinking skills approach is provided. The paper argues that both focus on real problems and issues and provision of clear unambiguous instructions are critical fundamentals of critical thinking skills development. The paper also illustrates how to develop critical thinking assignments by providing five examples of course assignments within business education.

Keywords

Bloom's taxonomy, critical thinking development,
assignments, projects, problem solving

JEL Classification A20

INTRODUCTION

The goal of college education is to develop critical thinking skills which allow graduates to make effective decisions in their professional careers and private lives (Humphreys, 2013). The ability to think critically in the 21st century requires students to develop skills of asking and answering questions, solving problems that will foster knowledge, comprehension, application, analysis, synthesis, and evaluation as the elements of critical thinking (Braun, 2004; Khalifa, 2009). Despite the expressed support for critical thinking as a crucial point for teaching, modest effort is dedicated to meeting that goal. Evidence of successfully implementing critical thinking in business classroom is occasional and "critical thinking, while regarded as essential, is not clearly or commonly understood" (Lloyd & Bahr, 2010, p. 13).

This paper presents a critical thinking strategy to argue that management majors will advance critical thinking skills by completing projects, assignments, and coursework through a sequence of gradually challenging thought progressions. The proposed process of critical thinking development utilizes a six-stage model based on the 21st century Bloom's taxonomy model (Bloom, 1974). The model guides students' work via six stages of critical thinking: stage 1: Remembering; stage 2: Understanding; stage 3: Applying; stage 4: Analyzing; stage 5: Evaluating; and stage 6: Creating.

The paper also provides examples of how to structure assignments and reports so that the critical thinking process is properly developed at each level. The paper presents the following examples at a freshman level in the Principles of Macroeconomics course: A COUNTRY REPORT PROJECT; at the sophomore level in Introduction to Business: BUSINESS PROFILE RESEARCH ASSIGNMENT; at the junior level in the Financial Management course: WORKING WITH FINANCIAL RATIOS; and at the senior level in both the Systems Analysis and Design course: USER INTERFACE PROTOTYPE DESIGN and in the Personal Financial Planning course: CREATING A RETIREMENT PLAN.

The paper helps to bridge the gap that exists between theory and practice in the teaching of critical thinking. The paper concludes that delivery of Bloom's taxonomy-based thinking and analysis process in a business classroom should equip students with the higher-order cognitive skills associated with critical thinking. The development of critical thinking skills should focus on analyzing case studies with given unambiguous guidelines and instructions.

1. LITERATURE REVIEW

Most of the orthodox literature on critical thinking is highly theoretical, concentrating on attempts to define critical thinking (Black, 1952; Ennis, 1962). Over the years, the literature has presented an extensive list of definitions of critical thinking that views it as synonymous with other general thinking processes to equate critical thinking with reflective thinking (Siegel, 1988; Green et al., 1990). According to Ennis (1989), critical thinking is a reasonable assessment of statements and clarification of their meanings. Baker and Anderson (1987) argue that critical thinking requires students to identify causes, reasons and effects, to assess the relevance of evidence, and to recognize and classify assumptions based on principles. Other definitions of critical thinking are made in terms of formal or informal logic and of general problem-solving skills (Sternberg, 1985). Brookfield (2012) defines critical thinking as a process of questioning and reflecting on experiences, which allows students to become effective thinkers and hence successful throughout their careers.

Scholars argue that critical thinking does not develop independently without instructional assistance during a course of study and doesn't arise solely from reading texts and taking exams or by listening to a professor's lecture. Creating a classroom environment that encourages questioning, probing, applying, analyzing, synthesizing, and evaluating will advance critical thinking (Brookfield, 2012). A conceptual framework of critical thinking can be adopted from the Bloom's

taxonomy of higher-order thinking skills (Bloom et al., 1971). Benjamin Bloom developed a hierarchical framework for categorizing students' levels of learning and development, which led to establishment of the Bloom's taxonomy model.

This model consists of several levels of difficulty and complexity of intellectual or thinking skills, where every level of learning is a precondition to the next stage. The author identified six levels of critical thinking development, which are organized from the simplest to the most complex stages or levels, and they include: knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom, 1974). This framework for critical thinking development determines that students must master all steps in its recommended order to advance those cognitive skills. Bloom's model has been traditionally used as a method for the development of teaching approaches that foster critical thinking and reasoning. Any critical thinking assignment should be designed as a step-based learning process. To think critically, students must acquire increasingly complex discipline content by gradually and actively developing and practicing the skills of critical thinking.

A series of stages proposed by Bloom have demonstrated successful development of critical thinking skills, where each stage of the process is important and requires an effective instruction for the learning and advancement of critical thinking to take place (Terenzini et al., 1995). Over the years, the Bloom's model has been revised (Anderson & Krathwohl, 2001), where Knowledge was replaced by Remembering, Synthesis by Evaluating, and

Evaluation by Creating. Several authors (Duran et al., 2006) adopted Bloom's model of taxonomy to influence classroom activities. They stressed the importance of asking and answering questions to foster knowledge, comprehension, application, analysis, synthesis, and evaluation as the elements of critical thinking. Models of critical thinking provide explanation and validation of the stages of inquiry necessary to develop critical thinking skills.

Recent studies illustrate how to advance critical thinking skills with specific resources or instructional methods, but those studies are insufficient and have been highly theoretical (Heinrich et al., 2015; Duron et al., 2006). For example, Ortiz (2000) emphasizes the importance of experiential learning in critical thinking development. Behar-Horenstein and Niu (2011) argue that solving difficult problems enhances critical thinking and stress the importance of quantitative courses, which allow students to develop critical thinking, as they work on difficult mathematical and statistical problems. Fisher (2001) provided examples of case study assignments within business courses that are designed to help students practice critical thinking and advance it to a higher level. However, there still appears to be little consensus about how to teach, develop, implement, and assess techniques used in development of critical thinking skills in business education. For that reason, this paper provides examples of active learning exercises that were designed to advance critical thinking. This paper contributes to the existing literature on critical thinking pedagogy in business education by providing examples of written assignments that are constructed on the 21st century Bloom's taxonomy model, which contributes to critical thinking development.

2. INSTRUCTIONAL APPROACHES TO CRITICAL THINKING

There are several ways to keep students actively involved in the learning process while developing critical thinking. The various elements of learning, which include self-learning, collective learning, passive learning, experiential and active learning,

have their place as part of a series of mutually reinforcing activities for critical thinking development. Lectures, games, simulations, experiments, class discussions, presentations, and debates can be designed to emphasize a specific type of learning and to break down barriers between theoretical and empirical application. Independent research studies and projects also offer opportunities to frame a structured problem solving and analytical examinations that are based on a Bloom's taxonomy model. Another way to teach students critical thinking is to use written assignments. The nature of written reports, essays, and assignments that are effective in teaching critical thinking abilities varies with both the discipline and the ways the individual instructor defines and teaches critical thinking. All, however, share certain basic characteristics such as a stage or level of development of critical thinking skills, an emphasis on actual issues and problems, and straightforward guidelines. The nature of these characteristics is outlined below.

2.1. Step-wise development of critical thinking skills

Critical thinking process in the U.S. Coast Guard Academy (CGA) Department of Management is based on the 21st century Bloom's taxonomy model. The model guides students' work via six stages of critical thinking based on Bloom et al. (1956): stage 1: Remembering; stage 2: Understanding; stage 3: Applying; stage 4: Analyzing; stage 5: Evaluating; and stage 6: Creating. Stage one, Remembering, requires students to remember ideas, words, methods, terminology, and concepts so that they can recall them in the same form as they encountered them. The second stage requires students to understand statements and information provided. The skill of Understanding can be nurtured by observing, listening, reading, rewriting lecture notes, and complements with notes obtained from supplemental readings so that the meaning of statements and ideas is grasped completely. In the next four stages, students must mentally put things in different terms, translate and recognize them, identify assumptions, ambiguities and problems, analyze and apply the concepts learned to the unfamiliar problems and situations, and then make inferences and extensions of thinking based on principles given.

In the fifth stage, Evaluating, students must organize and evaluate statements and information that are conveyed by contrasting, comparing, and finally evaluating. Students must make judgments about the material and articulate the reasons for evaluation. At that stage, students must use higher-level reasoning (logical argument, scientific research, empirical evidence) rather than lower-level reasoning (peer pressure, conformation of one's own beliefs) to support their positions. In addition, they must assess whether the author provides sources of evidence, refines generalization with appropriate qualifications, and the reliability of observation statements. They must also make judgments about the value of materials and methods and decide if they agree or disagree with the author's position. In that last stage, Creating, a creative statement is made, and a logical empirical proposition is developed, which must be sustainable. In this process, students rework and synthesize material into a coherent presentation that can be disseminated through written or oral work to provide a creative resolution. Our experiences show that the model is able to successfully facilitate critical and analytical thinking in the business and economics learning process.

2.2. Focus on real problems and issues

An important characteristic of effective learning with critical thinking is that concepts and topics must relate to actual problems and students should use their own experiences. The problem with many assignments rests with their detached and abstract nature. To develop and practice critical thinking skills, students must begin with the practical application of a concept before they move on to the abstract. For example, asking students to discuss the differences and similarities between theoretical models would likely result in a rather dispassionate clarification of terminology. A more useful approach would be to pose a problem that students can identify with through their own experiences, in order to ask them to work on real problems and issues and not with a purely theoretical model. Another way to help students apply classroom theory to practical experience that also emphasizes critical thinking is to assign projects to be done outside the class. Such exercise provides students with opportunities to think about

and critically evaluate their own concrete experiences. These assignments should be brief and simple projects of observation or interviews that draw on students' life experience and resources.

2.3. Give clear unambiguous instructions

It is important that the purpose of each assignment be clearly thought out if it is going to successfully foster the critical thinking process. Any potential for misinterpretation in the written instructions should be minimized. If the course or assignment objectives are not stated clearly, or if explanations or assignment directions are vague or ambiguous, students will be confused and frustrated.

2.4. Structuring critical thinking reports and projects

The process of critical thinking in any report or project begins with students reading the instructions they were given and understanding the nature of the task set before them. The completion of any report or project corresponds to the six-stage model adopted from the 21st century Bloom's taxonomy model. The way the project sets out students' work is achieved via multiple stages of critical thinking outlined below in the following six stages: stage 1: Remembering; stage 2: Understanding; stage 3: Applying; stage 4: Analyzing; stage 5: Evaluating; and stage 6: Creating. A detailed analysis of the six-stage critical thinking process and description is provided in Table 1.

Table 2 presents six stages of development of critical thinking and recommendation on what questions students should be asked at each stage to not only properly develop projects or assignments, but also to develop critical thinking skills.

Based on Table 3 presented below, it can be concluded that process of critical thinking development requires time and sequential process that students must be guided through. Students will develop and master critical thinking skills if they go through processes that involve memorizing, comprehending, relating, applying, examining, assessing, deducting, and creating. Developing critical thinking skills must be guided by providing questions that are provided by the instructor throughout all six

Table 1. The six-stage critical thinking process and description

Source: Management Department, U.S. Coast Guard Academy.

Stage 1: Remembering

Students must remember the concepts, theories, dates, events, places, facts, concepts, key ideas, graphs and diagrams. Before any analytical process begins, they are expected to recognize new concepts, models, graphs, and equations. Without memorization, critical thinking process cannot proceed further. Students are provided with some directions by being asked to recall memorized information, facts, terms, formulae, and principles included in the assignment.

Stage 2: Understanding

This is the most critical stage, as students must have sufficient understanding of the concepts to be successful throughout the whole learning process. A clear understanding of the material is an important step, which represents deep learning and the student's involvement in the critical thinking process. In order to gain understanding and complete the assignment, students are required to recall, define, and interpret principles outlined in specific theories of the course. To facilitate the understanding and the interpretation of concepts, they must find the meaning of concepts, definitions, or equations, interpret facts, infer cause and consequence, and translate theory into practical concepts. In this way, the interpretation process forms a link between the theories delivered in a textbook or in the classroom to life or reality they have experienced outside the classroom setting and are expected to develop within the report or project.

Stage 3: Applying

Students are expected to apply information in a new situation, solve problems using what they have memorized and understand. They can be helped by providing them with questions that lead them through the process and asked to identify the known and unknown elements of the problem, to structure these elements according to a known model, and to choose a method or principle that allows them to solve the problem using that method or applying specific principle. As an application of theory to real world problems is difficult for most students, the teacher must help students apply the theory and the data to a specific problem. Therefore, it is necessary to provide students with clear and unambiguous instructions that act as a checklist.

Stage 4: Analyzing

Students are expected to take apart a specific idea or body of knowledge. It is recommended to use questions that focus on breaking down the whole into parts, identifying the relationships that exist among these parts, and revealing the principles of theory. Students recognize, explain patterns and meaning, see parts and whole picture of concepts and theories to analyze the material and detect relationship among different concepts and elements of the project. This analytical process is central to critical thinking as it helps students develop an awareness of context and assumptions under which specific theory operates. Students are expected to express themselves and to think independently. Teachers can ask questions to elicit personal reactions, opinions, and thoughts and to show a sense of creative activity, using information that the students have learned.

Stage 5: Evaluating

Students are expected to use their critical judgement to evaluate ideas to which they have been exposed or work by asking questions that lead them to judge and show expertise. They will also make recommendations, assess values, make choices, and critique ideas. This stage provides students first-hand experience with evaluating the inherent difficulties that emerge when applying theory in a real world environment. By encountering a variety of problems and working to resolve them, students come to the realization that theory and reality will never be perfectly superimposed. Students' work is expected to prove that making links between theory and real world problems can be sufficient to produce meaningful results.

Stage 6: Creating

In this stage, students are ready to creatively apply their understanding of concepts and theories. Creating means generating something new which can be accomplished by violating accepted assumptions and applying concepts in the imagined situation and finding solutions to expected learning tasks.

Table 2. Six stages of critical thinking and development of projects and assignments

Source: Developed/used by Management Department, U.S. Coast Guard Academy and based on Bloom's taxonomy and critical thinking by Mariely Sanchez (www.sanchezclass.com/handbook/blooms.pdf).

Critical thinking stages	Questions to ask
Stage 1: REMEMBERING	Can you recall concepts/graphs/theories...? Name the concepts, theories, graphs you plan to use. What are those the concepts/theories/graphs? Can you list them?
Stage 2: UNDERSTANDING	What do the concepts/theories/graphs imply/mean? Can you explain what they mean? Can you explain and summarize them using your own words? Can you compare them with other concepts/theories/graphs you learned earlier?
Stage 3: APPLYING	How/where would you apply the concepts/theories/graphs? How would you use them? Show your understanding of the concepts/theories/graphs while applying them to case studies. Illustrate how to use the concepts/theories/graphs.
Stage 4: ANALYZING	After using the concepts/theories/graphs, how would you categorize and what interpretation can you make about them? How would you classify them? Do you observe any trends, relations, correlations?
Stage 5: EVALUATING	Evaluate how your results/analysis would change if some assumptions were not applied? What is your opinion about them? Can you explain how they justify your answers? Are they helpful to make judgments and evaluations?
Stage 6: CREATING	Can you use these concepts/theories/graphs within other contexts, applications and case? How would your answers change if you adapt those concepts/theories/graphs to create and present a report with a creative resolution/determination/conclusion?

Table 3. Management Department critical thinking development by stages and coursework

Source: Management Department, U.S. Coast Guard Academy.

Critical thinking stages	Freshman (F)	Sophomore (Sh)	Junior (J)	Senior (S)	Examples of courses
Stage 1: REMEMBERING	X	X	X	X	Macroeconomics Principles (F) Introduction to Business (Sh) Financial Management (J) Systems Analysis and Design (S) Personal Financial Management (S)
Stage 2: UNDERSTANDING	X	X	X	X	Macroeconomics Principles (F) Introduction to Business (Sh) Financial Management (J) Systems Analysis and Design (S) Personal Financial Management (S)
Stage 3: APPLYING	X	X	X	X	Macroeconomics Principles (F) Introduction to Business (Sh) Financial Management (J) Systems Analysis and Design (S) Personal Financial Management (S)
Stage 4: ANALYZING	X	X	X	X	Macroeconomics Principles (F) Introduction to Business (Sh) Financial Management (J) Systems Analysis and Design (S) Personal Financial Management (S)
Stage 5: EVALUATING	–	–	X	X	Introduction to Business (Sh) Financial Management (J) Systems Analysis and Design (S) Personal Financial Management (S)
Stage 6: CREATING	–	–	–	X	Systems Analysis and Design (S) Personal Financial Management (S)

stages of learning. This six-stage process facilitates critical thinking development that must be accomplished in sequence. Any individual or group project, written essay, or oral presentation assigned and required must be completed within this six-stage process which, will allow critical thinking skills to be developed.

In Appendices A, B, C, and D, the authors present examples of critical thinking assignments or projects that were progressively used from freshman to senior level: freshman level: Macroeconomics Principles; sophomore level: Introduction to Business; junior level: Financial Management; and senior level: Systems Analysis and Design and Personal Financial Management. The purpose of all four assignments was to enhance the attributes of a student learning required con-

cepts and theories and to develop critical thinking skills while completing projects and/or presentations. To achieve this, all students were given projects to complete in which they were expected to collect and analyze information and data that were relevant to concepts, theories, and graphs that students were expected to learn in a specific class. Examples of selected projects are provided in Appendix A (freshman level: a Country Report in Macroeconomics Principles, Appendix B (sophomore level: Business Profile Research in Introduction to Business), Appendix C (junior level: Working with Financial Ratios in the Financial Management course), and Appendix D (senior level: User Interface Prototype Design in the Systems Analysis and Design course; and Creating a Retirement Plan in Personal Financial Planning).

CONCLUSION

Current teaching and learning strategies in undergraduate programs fail to give sufficient attention to critical thinking development and advancement. This failure stems primarily from the persistent commitment to teaching methods that stress memorization. Critical thinking does not develop naturally, but it must be fostered gradually through specifically developed processes, as students learn sequentially more difficult concepts while advancing to higher level of cognitive thinking. Critical thinking literature recommends that specifically designed analytical frameworks must be taught progressively with

clear instructions at each stage. The process must begin with simple tasks, such as memorization and understanding, towards more complex operations that finally lead to effective analysis, evaluation, and creation. The 21st century Bloom's taxonomy model is the best representation of the model that has been widely used and applied in an academic setting. This paper argues that creating a classroom environment based on designing clear and effective written assignments and projects will allow students to gradually develop through six levels of critical thinking model.

In sum, an approach to critical thinking instruction, which is appropriate for undergraduate students, is based upon the conceptualization of critical thinking that incorporates Bloom's taxonomy (1971 and 1974). Six formal stages of critical thinking and reasoning must be sequentially used to foster independent and critical thought. The ability of teaching to convey ideas effectively to students and develop critical awareness and thinking depends on teachers' capacity to understand students' perspectives and orientation, to recognize the experiences of students and to connect with students' prior knowledge. Creating frameworks for critical thinking development takes time and patience. Students will become critical thinkers, if they are guided and allowed to develop and practice critical thinking sequentially throughout the specifically designed six stages of Bloom's taxonomy.

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APPENDIX A

FRESHMAN LEVEL: MACROECONOMICS PRINCIPLES

A Country Report

Each student is assigned to work and prepare a country report that will also be presented at the end of the semester. The report and presentation will be graded on how effectively a student remembers, understands, applies the economic concepts, and is able to use and apply those concepts to analyze economic performance of a country in the context of current events. Both, the report and presentation, should be based on the economic concepts, theories, and graphs that were presented in class and in the textbook. Students are also encouraged to use articles from a national news outlet, official research, or government websites that are available on the Internet or from a printed newspaper or magazine. After reading and understanding the selected articles and sources, students must answer the following questions that are presented below.

Table A1. Stages of completing the project

Source: Principles of Macroeconomics, U.S. Coast Guard Academy.

Stages of completing the project	Questions to be answered
Stage 1: REMEMBERING	What are macroeconomics concepts that you plan to use while working on your country project? Please list them and define. Do you plan to use graphs? What are those graphs? How do they work in a context of your presentation? And what do they illustrate?
Stage 2: UNDERSTANDING	Are they all valid economic concepts, graphs, or instruments to be used to evaluate country's economic performance? How would you use those selected concepts and graphs to explain the current events affecting economic performance of your country? What is the main idea of using those concepts or graphs? How would you relate economic concepts or graphs to the current events?
Stage 3: APPLYING	How would you use selected macroeconomics concepts, theories, and graphs to apply in your project? How would you show your understanding of those concepts in your project? What would result if you apply additional concepts or graphs? Did you use correct graphs and concepts why explaining your points?
Stage 4: ANALYZING	Why do you think selected concepts, graphs, theories are the best to be used, applied and analyzed? What inference can you make on your country in a context of current events? What conclusions can you draw about your country after your applied selected concepts, theories, and graphs? How would you categorize each concept, theory, or graph: irrelevant, relevant, good, or outstanding to be applied in order to complete your project?

You will prepare a two-page written report and deliver a 10-minute PowerPoint presentation at the end of the semester. Your grade will reflect how effectively you remember, understand, and apply the economic concepts studied in class. You will apply these class topics as you present economic concepts, theories, and data specific to another country. You are encouraged to use articles from national news outlets, official research, or government websites that are available through the Macroeconomics course guide on the CGA library webpage.

While working on your project, please collect data for at least ten years and it is recommended to include as many years as there are available for your country. Data must be collected on the appropriate items/categories and for a period sufficient to give an accurate economic picture of the country/analysis you plan to conduct. Your report can not be more than two pages. It must be typed (single-spaced). Your finished report should be a concise, clear, and good representation of your country. Content, accuracy, conciseness, relevance of information, and overall appearance all play significant roles in the report's evaluation.

Steps to complete your project (please utilize the table provided above):

1. Select a country and determine the topic of your presentation and project.
2. Determine direction of your presentation and the scope of your project and presentation: what economic concepts and data you will use.
3. Collect information on basic characteristics of a country and current events.

4. Find sources that you will use for your country's information and data collection.
5. Select the most important sources that are required to support your topic and complete your project.
6. Select eight economic indicators to complete your project.
7. Analyze your data and provide economic interpretation, analysis of economic policy, etc. (all depends on your presentation's topic).
8. Develop graphs and select those that best support your argument and discussion.
9. Summarize your project and develop conclusions.
10. List your references/sources in an alphabetical order using Chicago Style.

APPENDIX B

SOPHOMORE LEVEL: INTRODUCTION TO BUSINESS

Business Profile Research Assignment

A business profile is an informative report on a specific company as viewed through the lenses of the primary business topics, which consist of the Business Ethics and Social Responsibility, Management, Operations, Human Resource Management, Marketing, Finance and Accounting. Each business topic paper is comprised of a maximum of 5 pages (double spaced, not including cover, figures, appendices, and works cited pages), analysis covering external industry influences, key themes in the topic, best practices in the topic, competitor's response to the key themes, and the profile company's performance in the key themes. Over the semester, a student will accumulate a profile of how the company executes its vision from the perspective of each of the primary business topics. Target page length of the entire report is 35 pages (double-spaced, not including cover, figures, appendices, and work cited page).

Table B1. Stages of completing the project

Source: Introduction to Business, U.S. Coast Guard Academy.

Stages of completing the project	Questions to be answered
Stage 1: REMEMBERING	What are the key concepts associated with the business topic? What are the general characteristics of the industry of the profiled company?
Stage 2: UNDERSTANDING	What are the best practices within industry for the given business topic? What are the best practices outside of industry for the given business topic?
Stage 3: APPLYING	Applying best practices within any industry, how can the profiled company learn from other companies?
Stage 4: ANALYZING	Using the PEST Framework, what are the external influences that affect how the profiled company performs within the business topic?
Stage 5: EVALUATING	What is the performance of the industry competitors? What is the performance of the best companies for the given business topic? What recommendations do you have for the profiled company to achieve optimal performance of all 5 business topics?

The purpose of this assignment is to: (1) give you practice in conducting research; (2) expose you to real-world company performance data; (3) force you to interpret and analyze the results of your company assessments; and (4) evaluate the strengths and weaknesses of your profiled company in light of best practices, competitor performance, and external influences.

1. You will select a publicly traded company (listed on a stock exchange) and using resources from the library, you are to obtain company background, scholarly articles, press releases, balance sheets and income statements.

2. This project will be completed in five steps. Step 1 is to acquire knowledge about the assigned profiled company and industry. You will first conduct a literature review to identify existing information about the company and the five business topics. Step 2 is determining the external influences, using the PEST Framework, that affect the performance of the profiled company. Step 3 is identifying the best practices within and outside industry for the given business topics. Step 4 is evaluating the performance of the profiled company relative to the best practices and the company's competitors. Step 5 is providing valid recommendations on how the profiled company can improve, given the characteristics of the industry, external influences, understanding of best practices, and understanding of competitor performance.
3. This project will be presented as a typed report in the following format:
 - (1) length: not to exceed 35 pages double-spaced (APA);
 - (2) executive summary: 1 page executive summary provides a synopsis, methodology, and recommendations;
 - (3) table of contents: 1 page listing business topics and figures/tables;
 - (4) analysis: 5 to 6 pages per business topic (Business Ethics and Social Responsibility, Management, Operations, Human Resource Management, Marketing, Finance and Accounting) informs your audience about your findings;
 - (5) conclusion: 2 to 3 page conclusion persuades your audience that your proposed improvements are valid;
 - (6) appendix: the rest of the paper will consist of the financial statements and any other figures or tables that you refer to in your analysis; and
 - (7) works cited: APA format.
 - (8) Your final grade will be determined by the completeness of the project, adherence to the instructions, the quality of your analysis, and the overall impression your project makes. Spelling and grammar are critical components of the project's presentation, so careful attention should be paid when proofreading the final report. Your tone should be professional as you guide other interested professionals to understand your analysis and ways that your research supports that understanding. The audience of your paper is the business community and other professionals who are interested in your profiled company.

APPENDIX C

JUNIOR LEVEL: FINANCIAL MANAGEMENT

Financial Ratio Analysis

Financial Ratio Analysis is one of the principle tools available to the financial manager. These ratios provide insight into various aspects of the company's performance. The ratios fall into several categories that provide performance metrics that are useful to the manager. Financial management is the student's introduction to the financial analysis of firms. The assignment is for the student to select a firm and calculate the firm's financial ratios. Using these ratios, the students write up their impression of the company's performance. They also assume the role of "management consultant", as they make suggestions as to changes that would improve the company's financial performance.

Table C1. Stages of completing the project

Source: Financial Management, U.S. Coast Guard Academy.

Stages of completing the project	Questions to be answered
Stage 1: REMEMBERING	What are the financial ratios? What formulas are used to calculate these ratios? What categories (or groups) do they belong to? Where are the data found to calculate the ratios?
Stage 2: UNDERSTANDING	What do the numerical values of these ratios mean? Some are in percentage form, some are multiples, while others represent time. Which ratios correspond to high values being better than low values? And if higher is generally better, does that imply that this ratio should be maximized?
Stage 3: APPLYING	This is the step in which the ratios are calculated. Are the results reasonable? For instance, if operating income is negative, then net income should also be negative. Are the results consistent? How effectively is the firm using its assets to produce sales/income?
Stage 4: ANALYZING	While the individual ratios are examined, it is also necessary to look at the ratios as a whole. Overall, is the firm in good financial shape? Or does it face a serious threat to its financial stability because of a significant weakness in one area (ratio category)? Are there mitigating factors that make a low (and potentially dangerous) ratio to be an acceptable situation for this firm?
Stage 5: EVALUATING	It is important to examine financial ratios within an appropriate context. For instance, what is a normal ratio level for a firm in manufacturing may be an abnormal level for a firm in the service industry. Thus, the ratios should be examined relative to industry norms. Where is that information found? In addition, examining a single year is not as useful as examining several years. A single data point will not indicate a trend, but the trend is what is important.

The purpose of this assignment is to: (1) give you practice in calculating financial ratios; (2) expose you to real-world financial statements; (3) force you to interpret and analyze the results of your calculations; and (4) evaluate the financial strengths and weaknesses of your chosen firm in light of the average financial ratios for your firm's industry.

1. You will select a publicly traded firm (listed on a stock exchange) and obtain the balance sheets and income statements for the last three years. (Yahoo Finance and MSN Money are two readily available sources for this information. The firms are listed by the company's "ticker" symbol). If you cannot find financial information on your firm, it may be that the firm is not publicly traded but is privately held. PICK ANOTHER FIRM.
2. This project will be completed in four (4) steps. The first step is obtaining the financial statements for a 3-year period. Step 2 is calculating the each of the specified financial ratios for the three years in question. Step 3 is finding the industry averages for the specified financial ratios.
3. The final step is the analysis of these ratios in light of the industry average ratios. What is your impression of the financial health of this firm? Are there some ratios that you weight more heavily than others? Why or why not? What changes and/or suggestions would you make if you were the chief financial officer? Why?
4. This project will be presented as a typed report in the following format: page 1: an executive summary of your analysis, no more than a single page; page 2: your complete analysis; while there is no specific length required, I believe that it will require at least three pages to cover the topic thoroughly.
5. The rest of the paper will consist of the financial statements and industry averages that you refer to in your analysis.
6. Your final grade will be determined by the completeness of the project, adherence to the instructions, the quality of your analysis, and the overall impression your project makes. Spelling and grammar are critical components of the project's presentation, so careful attention should be paid when proofreading the final draft.

APPENDIX D (EXAMPLE ONE)

SENIOR LEVEL: SYSTEMS ANALYSIS AND DESIGN

User Interface Prototype Design

As part of a semester-long project, students form small groups of three to four students and perform activities of the four phases of the systems development lifecycle: planning, analysis, design, and implementation. The group is tasked to conceptualize an information system that would serve a practical and useful purpose. This system concept is further developed with multiple assignments that correspond to the essential activities within the phases of the systems development lifecycle. The groups' work takes the form of deliverables typically produced in an information systems project. This example, a user interface (UI) prototype design, represents one of multiple deliverables in the semester-long project. By this point in the project, groups have explained the need for the proposed system, analyzed the feasibility of creating such a system, specified the requirements of what the system must do in terms of functionality and behaviour, and designed a logical model for the data structure. The user interface prototype addresses the organization of the sections of the system, navigation between the sections, appearance of the system, and basic interaction between the user and the system.

Table D1. Stages of completing the project

Source: Systems Analysis and Design, U.S. Coast Guard Academy.

Stages of completing the project	Questions to be answered
Stage 1: REMEMBERING	What are the basic principles of user interface design? Describe these principles.
Stage 2: UNDERSTANDING	Explain how each design principle enhances system usability when incorporated in the UI of the system?
Stage 3: APPLYING	Examining some provided applications or websites, can you identify how the design principles are manifested in the subject UIs?
Stage 4: ANALYZING	What applications or websites utilize UIs, which adhere to the design principles? Specifically, how do UIs incorporate these principles? What applications or websites utilize UIs, which seem to be lacking these design principles?
Stage 5: EVALUATING	What makes these UIs lacking in their design? How would you assess the usability of these applications or websites? What changes need to be made in order enhance the usability of these applications or websites? Can you find examples of applications or websites, which do not follow the design principles, but still create a high level of usability? What characteristics of the UI support the application or website usability?
Stage 6: CREATING	Who are the target users of your information system project? What design principles will be most important to your UI design? How will you implement these principles to maximize usability? Are there any design principles, which will not apply to your UI? Why?

This assignment is for you to apply your knowledge of usability design principles to the creation of a prototype UI for your information system project.

1. The prototype UI should simulate, as closely as possible, the user experience in using the project information system. The UI prototype should be designed to provide the best usability for your target users. It should make use of accepted design principles to provide this usability. Deviations from design principles should be done deliberately and with justification for the deviation.
2. Your assignment is to create a UI prototype and supporting documentation. The prototype should model at least five screens or pages of your information system. In addition to the working prototype, provide documentation which explains the purpose and functionality of each section or page of the information system. The documentation should also explain the normal operation of that section, any help options or tool tips available, validation of input data, and error messages and error

handling that the page or section will provide. Finally, the documentation should provide a graphic which depicts the layout of the information system and the navigability of the system.

3. The working UI prototype should be completed using an application such as PowerPoint, Publisher, or constructed in HTML and CSS. The prototypes should make use of working hyperlinks to simulate the navigation from section to section in the application and provide a realistic user experience. The supporting documentation should be completed in Word and include screen shots from the working prototype. The supporting documentation should include a cover sheet, page numbering, figure labels, and be single spaced.

APPENDIX D (EXAMPLE TWO)

SENIOR LEVEL: PERSONAL FINANCIAL MANAGEMENT

Creating a Retirement Plan

Of all the tasks in the area of personal finance, retirement planning is the most challenging. A retirement plan begins when you start saving (hopefully early in your career) and ends with your death. This entire period could easily be over sixty years. It is made even more difficult by the fact that your life expectancy is unknown, making it uncertain as to how long you will need retirement income. This uncertainty is also accompanied by unknown future rates of return on your investments. Changing tax laws also complicates this process.

Table D2. Stages of completing the project

Source: Personal Financial Management, U.S. Coast Guard Academy.

Stages of completing the project	Questions to be answered
Stage 1: REMEMBERING	Retirement planning is essentially an exercise in moving money through time. As such, it builds on the concept of the time value of money, a topic that students have covered in an earlier finance class.
Stage 2: UNDERSTANDING	Students often think that retirement planning begins with savings plan that will accumulate a significant nest egg. While a saving plan is critical in the process, it is important for students to understand that retirement planning begins with the goal of a target retirement income and the number of years the income is needed. Thus, it starts with the goal, and then develops the savings plan to achieve that goal.
Stage 3: APPLYING	Simple retirement plans are developed where the critical variables (desired retirement income, years of planned retirement, years of work life, and the rate of return) are all given. This step enables the student to become comfortable with the mechanics of retirement planning calculations.
Stage 4: ANALYZING	At this stage, students are expected to analyze the implications of the assumptions made in their initial retirement estimates. Pension funds may use life expectancy tables, because their retirement pool will reflect the average. An individual has more date on their own life expectancy based on the life spans of their parents and grandparents. Furthermore, a rate of return implies a certain level of risk. Are they comfortable with that degree of risk exposure? Do they want more or less risk and return?
Stage 5: EVALUATING	The analysis of the assumptions on the retirement variables leads naturally to an evaluation of those variables. The first question to answer is how much retirement income is desired? This requires an evaluation of expenses in retirement and a projection of the cost of living. Next, how many years is this income needed. Students are reminded that you do not want to outlive your retirement account, so there is less cost to overestimating your life expectancy than underestimating it. The rate of return is the next variable to determine. This variable's assumption can vary over time, as students may want to reduce their risk exposure as they age. Together, these three variables define the required nest egg at retirement. Their projected retirement age will determine the length of their saving period, which, in turn, will define how much they must save each year to reach their retirement goal.
Stage 6: CREATING	Using the variables defined above, the student will create their own unique retirement plan. The students must explain what assumptions underlie the variables that they are using. They will also address a number of "what if" questions, such as "How would I respond if my rate of return were lower than expected?" "Do you increase your savings contribution, accept more risk, postpone retirement, and/or accept a lower than planned retirement income?" Or "How would I handle a significant windfall?" Put it in the retirement fund, spend it, or a combination of the two?

The purpose of this assignment is to: (1) give you an appreciation for the factors involved in planning for retirement; (2) provide significant practice in the mechanics of the mathematical computations used in retirement planning; (3) make you aware of the implications associated with the assumptions you make in retirement planning; and (4) create a real-life financial plan for retirement that can serve as the foundation for your life after graduation.

1. You will create a retirement plan for yourself, based on the concepts that were covered in class. This project will span your working career and your retirement years. It will require you to apply the concept of the time value of money to a real-life problem that everyone agrees is important, but many fail to accomplish. This project will be completed in multiple stages. The results you determine at each stage will be specific to you.
 - *Length of retirement:* What is a reasonable expectation of your lifespan? How old were your grandparents when they died? Or great-grandparents if your grandparents are still alive? What lifestyle choices can you make now to affect your lifespan? What age do you plan to retire? How did you determine that retirement age?
 - *Desired retirement income:* What income do you expect to earn after graduation? What do you expect your average salary increase, or annual raise, to be? Express as a percent. Explain how you came to each of these estimates. Based on your initial salary, annual raise, and length of your working career, what do you expect your income to be the last year that you work? Take 80% of that figure for your target retirement income.
 - *Estimated rate of return on retirement savings:* What is your expected annual rate of return on your investments? What combination of stocks and bonds is implied by this return? Use the historical returns to the stock market, 10-year government bonds, and T-bills that we have worked with in class to justify your answer. Do you plan to adjust your expected return by changing the composition of your portfolio over time? Why or why not.
 - *Required savings at retirement and corresponding required annual savings:* Using your desired retirement income, retirement length, and expected rate of return, how large must your retirement fund be? Using the length of your expected work life and your expected rate of return, how large must your annual contribution to your retirement account be to reach your goal?
 - What if's: address the following questions:
 - a. What is the effect on your total savings if your rate of return is half the expected level for a single year at the age of 5? at the age of 15? at the age of 25? What changes to your plan do you do in response to such an event?
 - b. How would you respond if inflation exceeds expected levels?
 - c. Assume you inherit \$50,000 from your parents at the age of 55. Would that alter your retirement plan?
2. This project will be presented as a typed report in the following format: page 1 – an executive summary of your analysis, no more than a single page; page 2 – Your complete analysis. While there is no specific length required, I believe that it will require at least five pages to cover the topic thoroughly.

The rest of the paper will consist of the spreadsheets that show the accumulation of your retirement account while you are working and its subsequent draw down during your retirement period. Provide

a separate spreadsheet for each of the “what if” scenarios. Your final grade will be determined by the completeness of the project, adherence to the instructions, the quality of your analysis, and the overall impression your project makes. Spelling and grammar are critical components of the project’s presentation, so careful attention should be paid when proofreading the final draft.