

Full Length Research Paper

Identifying connections between career and technical education (CTE) and academic programs through standards of learning

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This article describes a Career and Technical Education (CTE) pre-service teacher preparation class project requiring students to identify academic standards of learning relating to the competencies that they teach in their program areas with a view to encouraging interdisciplinary collaboration between CTE teachers and colleagues in academic disciplines. Demonstrating that CTE can contribute significantly to academic growth as measured by SOLs should help in de-stigmatizing CTE. The method underlying the project described in this article comprised requiring CTE pre-service teacher education students to incorporate in their lessons standards of learning relating to (for example, English, Mathematics, Science, and History/Social science). The aim of this study was to show the relationship between CTE and academic subjects as a way of enhancing student motivation in CTE courses and also providing a rationale for co-ordination and cooperation between CTE teachers and teachers of academic subjects.

Key words: Standards of learning, collaboration, career and technical education, situated learning, reflections, best practices.

INTRODUCTION

One of the effects of educational legislation (such as No Child Left Behind) as well the consistent poor performance of K-12 students in national and international proficiency tests is pressure on school administrators to account for educational resources by demonstrating evidence of students' academic growth (Dee and Jacob, 2009; Nave, 2004). As Winkler (2002) pointed out, school activities and projects without apparent relevance to the standards for measuring academic growth are discouraged because they are seen

as taking away from the time that teachers and students should spend on meeting the set standards. As a consequence of this quest to justify school activities through measurable standards, at the onset of the No Child Left Behind Act and the standards-driven education reform, the future of Career and Technical Education (CTE) appeared uncertain (Kazis, 2005). There appeared to be an impression that CTE had no role to play in academic growth because "the overall goal of high school career and technical education is to prepare students for

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careers in business, industry, and human services” (Bottoms, 2005). This is of course an important goal not only for CTE but education in general. However, the other equally important goal of CTE, namely, preparing high school students to transition to post-secondary education, has either tended to be downplayed or is unknown by some people, sometimes resulting in threats to the future of CTE. Perhaps as a direct response to the uncertainty of the future of CTE, some studies were conducted before the passage of the No Child Left Behind Act to inform the debate on the need to sustain the place of CTE in the nation’s high school programs. Resulting from these studies, the contribution of CTE to academic growth and to the decline in the dropout rate has been well documented in the literature (ACTE, 2007; Bishop and Mane, 2004; Stone et al., 2006). Bishop and Mane (2004) shared the following interesting quote from the Report of the Advisory Committee for the National Assessment of Vocational Education (2003).

Career and technical education empowers students by providing a range of learning opportunities that serve different learning styles. CTE relies on a powerful mode of teaching and learning that cognitive scientists call “contextual” or “situated” learning, both in classrooms and in workplaces. For many students, applying academic and technical skills to real-world activities, using computers and other tools, and being able to see how their learning is related to the world of work make CTE classes more interesting and motivating, and more educationally powerful than standard academic classes. A career focus often gives students a sense of direction and motivates them to achieve and to stay in school (p. 383).

Although, there is now little doubt that CTE is contributing to both academic growth and workforce development, there is still need for CTE teachers to constantly demonstrate the importance of their programs. There is a chance that there are still some administrators and policy makers who think that spending money or other resources on CTE is a diversion of resources that ought to go towards raising standards of academic achievement. It is, therefore, a good idea for CTE teacher educators to help student teachers to identify and promote connections between their programs and academic disciplines through standards of learning (SOLs). This article describes a CTE pre-service teacher preparation class project requiring students to identify academic standards of learning relating to the competencies that they teach in their program areas.

METHODOLOGY

Aim

The aim of the project was to enable CTE student teachers to identify and describe the relationship between CTE and academic

subjects as a way of enhancing student motivation in CTE courses and also providing a rationale for co-ordination and cooperation between CTE teachers and teachers of academic subjects.

Timing

The project was implemented as part of the student teaching internship. Before students went to schools for their practice teaching, they had a project orientation which comprised sharing of project rationale and project procedures as well as materials production. During internship, students implemented the in-school project activities and prepared reflections on their experiences relating to the project.

Procedure

The procedure consisted of the following activities.

Orientation phase at college

- (1) Making CTE student teachers aware of the importance of incorporating SOLs in their CTE lesson plans;
- (2) Asking student teachers to identify SOLs relevant to each of their CTE courses;
- (3) Asking student teachers to prepare flyers or brochures showing how SOLs are incorporated in CTE courses;

In-school activities

- (1) Asking student teachers to make presentations at departmental meetings of each of the academic areas in their schools based on the information on the flyers/brochures.
- (2) Asking student teachers to discuss and evaluate the presentations with their cooperating teachers as well as the university supervisors.
- (3) Asking student teachers to maintain journals on their experiences relating to the project and submitting their reflections at the end of their internships to their university supervisors.

Project description

As they learn how to prepare lesson plans, students are taught to identify and indicate the Virginia Standards of Learning (SOLs) that relate to the task being taught. The SOLs are then listed in the lesson plan. Appendix 1 shows a lesson plan sample demonstrating inclusion of SOLs among the components of a lesson plan.

During the preparation for the semester-long student teaching session, students are asked to prepare at least one flyer or brochure demonstrating connections between their program area and an academic program. The target audience for the flyer/brochure is the academic department with which the connections are exemplified in the flyer/brochure. Upon satisfying the task requirements set by the CTE program faculty, students are asked to take the project further, guided by the following instructions.

Instructions

- (1) Using the website for Virginia’s Educational Resource System Online (Verso) as your reference, identify SOLs relevant to each of the courses in your program area that are taught at your student teaching site.

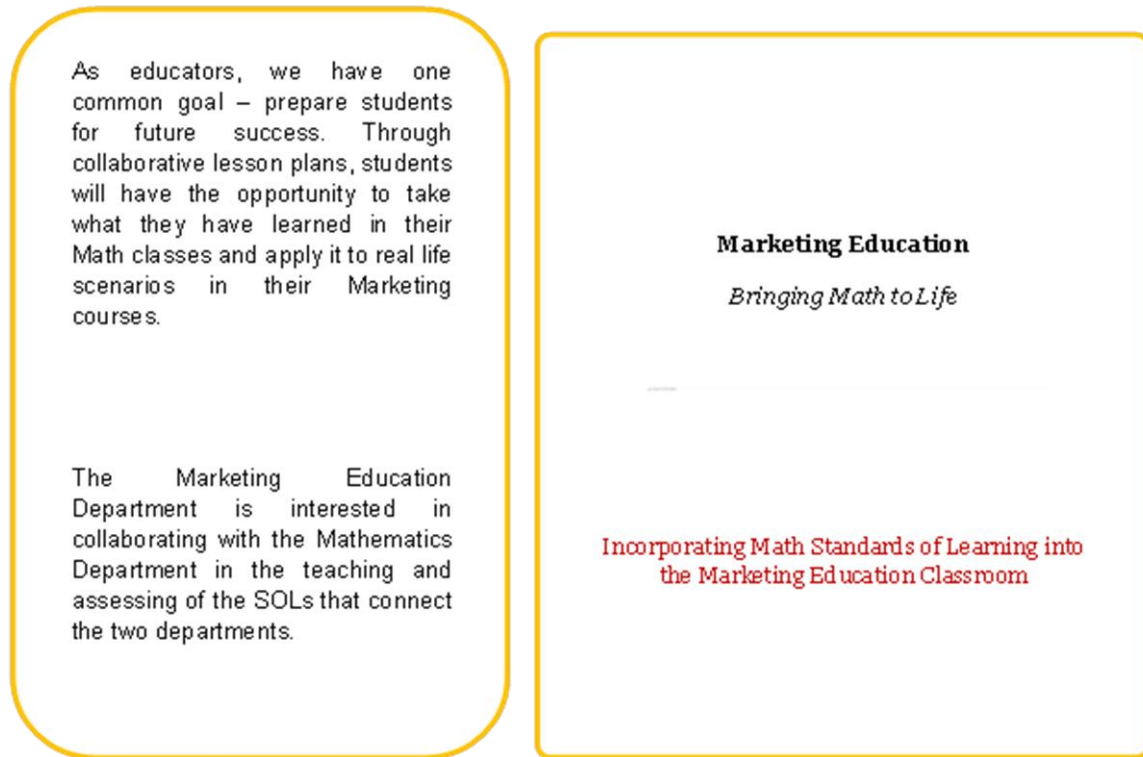


Figure 1. Front and back covers of flyer about Standards of Learning showing connections between Marketing Education and Mathematics.

(2) For each academic area (e.g. English, Mathematics, Social Studies, History), prepare a one to two page flyer or a brochure (you decide the number of folds) showing how SOLs in the academic area are incorporated in each of the courses at your school in your program area. The flyer or brochure must meet the following criteria: must have an attractive catchy title; must indicate the CTE program area; must indicate the academic area on which the SOLs are based; must indicate the course(s) in your program area; must indicate the SOLs relating to the course(s) (The brochure must have a minimum of ten SOLs (the SOLs will need to include their identifying numbers and be written in abbreviated form)); must indicate the competencies relating to the SOLs; must have a statement expressing your program's willingness to collaborate with academic subject teachers in lesson planning, delivery, and evaluation; must have contact details for yourself and all the teachers in your program area (Be sure to list your name last); must be free of grammatical, factual, and other errors; must be attractive in form and layout (e.g. color, font, and spacing, amount of white space used, etc.); and must have a date (at least month and year) written in small font. If it is a flyer, you could use the footer function. For a brochure, simply include the date on the back page in small font and at the bottom.

(3) Make a presentation at the departmental meetings of each of the academic areas in your school based on the information on your flyer/brochure. You may use PowerPoint or any other visual aid to supplement your flyer/brochure if you know that you will have enough time on the agenda of the meeting to do so. Invite an administrator(s) to each departmental meeting. Some meetings may have one administrator and others may have more, depending on the number of administrators in your school. The goal is to have all administrators to attend at least one of the departmental presentations.

Finally, you are to make a presentation at one of the guidance counselors' departmental meetings. For this presentation, you are to discuss the SOLs from all of the academic areas that are taught in the courses in the CTE program area. As with the other presentations, your flyer/brochure needs to be targeted to the audience you are addressing. Therefore, an overall flyer/brochure concerning SOLs from all of the academic areas that are taught in courses in your program should be highlighted and used in your presentation to the guidance department.

(4) After making the first presentation, do not move to the next presentations until you have discussed and evaluated the presentation with your cooperating teacher as well as the university supervisor.

(5) At the end of your internship period, submit your reflections on this assignment to your university supervisor.

Sample flyer

Figures 1 and 2 show a sample of a two-page flyer developed by a student to show connections between Marketing Education and Mathematics. The sample flyer shows how the following mathematics SOLs relate to marketing competencies.

(1) COM.1: TSW apply programming techniques and skills to solve real-world problems in mathematics arising from consumer, business, and other applications in mathematics. Problems will include opportunities for students to analyze data in charts, graphs, and tables and to use their knowledge of equations, formulas, and functions to solve these problems.

(2) PS.8: TSW describe the methods of data collection in a census,

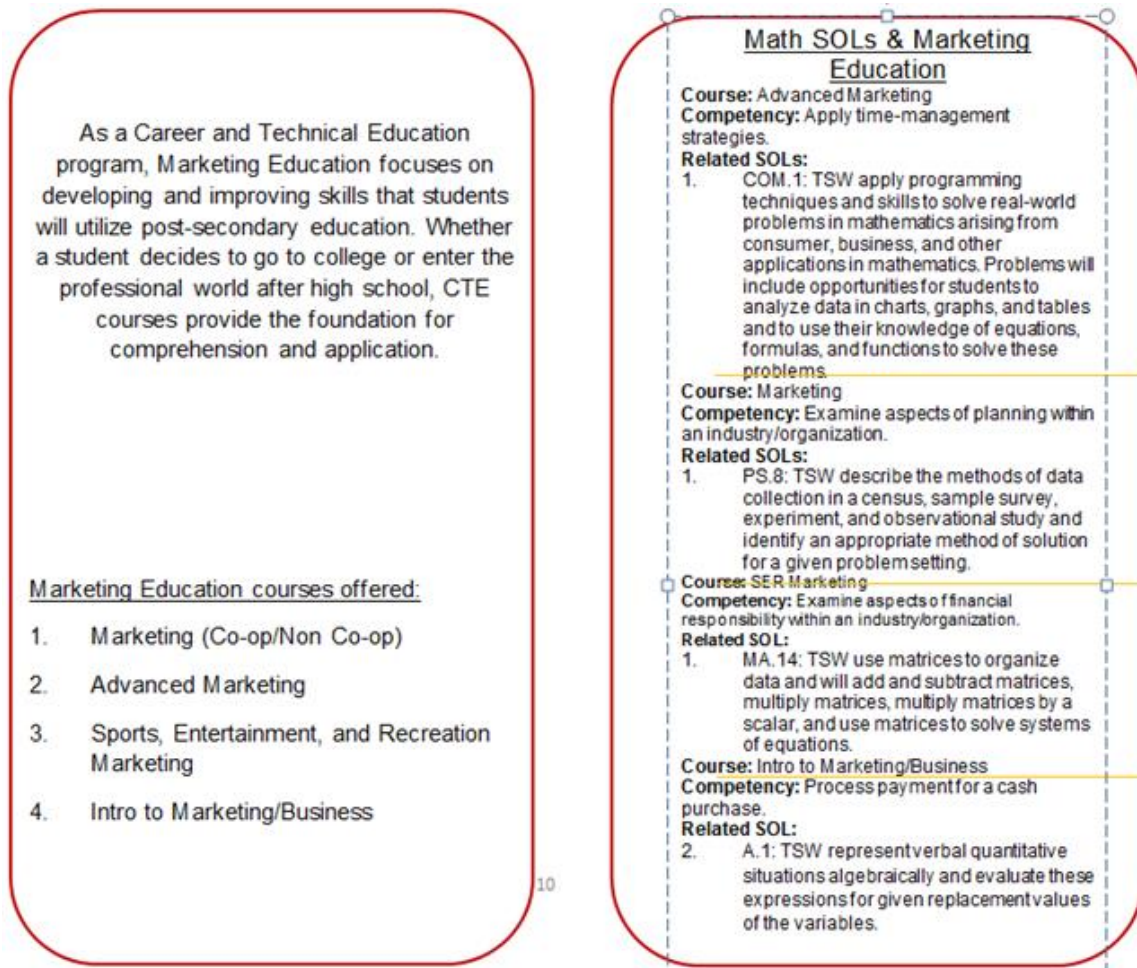


Figure 2. Inside pages of flyer about Standards of Learning showing connections between Marketing Education and Mathematics.

sample survey, experiment, and observational study and identify an appropriate method of solution for a given problem setting.

(3) MA.14: TSW use matrices to organize data and will add and subtract matrices, multiply matrices, multiply matrices by a scalar, and use matrices to solve systems of equations.

(4) A.1: TSW represent verbal quantitative situations algebraically and evaluate these expressions for given replacement values of the variables.

RESULTS AND DISCUSSION

Figure 1, among other things, conveys the Marketing Education's Department willingness to collaborate with the Mathematics Department. One of the assertions in Figure 1 is that: "As educators, we have one common goal to prepare students for future success." The wisdom of collaboration between CTE and academic teachers has been borne out by research (Stone et al., 2006; Johnson et al., 2003; Bodilly et al., 1993). The rationale for collaboration is that: "A single CTE teacher working with a math colleague will be more effective than either of

them working alone; but if they can interact with several others who are focused on the same objective, the effect will be exponential" (Stone et al., 2006, p. 69).

Figure 1 also says: "Through collaborative lesson plans, students will have the opportunity to take what they have learned in their Math classes and apply it to real life scenarios in their Marketing courses." The idea of relating classroom activities to real world experiences is grounded in contextual theories such as situated learning and situated cognition. According to Ormrod (2008), contextual theories "refer to situations in which learning and thinking are influenced by the physical and social contexts in which people are immersed" (p. 165). One of the characteristics of situated learning is authenticity of learning activities. In discussing this feature of situated learning, McCormick (2004) explained that authenticity has two sides. The first side concerns the extent to which learning is personally meaningful to the student. In other words, if a student is learning about problem solving, the problem should relate to something that matters to the student, something that has value outside the classroom.

For instance, a student desiring to be an accountant is likely to be motivated to learn about mathematical computations or linguistic competencies that relate to accounting situations. The second side of authenticity is cultural relevancy, which is about the extent to which a learning activity is culturally relevant and meaningful to the student.

It is not fully resolved by cognitive theorists that situated learning can account for transfer of knowledge and skills from, say, a CTE class to a mathematics class or vice versa (Ormrod, 2008). Some psychologists have challenged the claims made about the benefits of situated learning. For instance, Anderson et al. (1996), said:

“In general, situated learning focuses on some well-documented phenomena in cognitive psychology and ignores many others, while cognition is partly context-dependent, it is also partly context-independent; while there are dramatic failures of transfer, there are also dramatic successes; while concrete instruction helps, abstract instruction also helps; while some performances benefit from training in a social context, others do not. The analysis offered by situated learning sometimes seems a regressive move that ignores or disputes much of what has been demonstrated empirically. What is needed to improve learning and teaching is to continue to deepen our research into the circumstances that determine when narrower or broader contexts are required and when attention to narrower or broader skills are optimal for effective and efficient learning (p. 10)”.

Quite clearly, caution has to be taken when making claims for the benefits of using CTE contexts in the learning of academic disciplines. However, the prudence of caution should not obscure the well-documented evidence of the impact of CTE on academic growth as a result of the opportunities that CTE provides for creating authentic situations for learning academic disciplines (Plank et al., 2005; Bishop and Mane, 2004; Nave, 2004; Stone et al., 2006). The NAVE Final Report to Congress (2004) said about the impact of CTE on student achievement.

Over the last decade of academic reforms, secondary students who participate in vocational programs have increased their academic course taking and achievement, making them better prepared for both college and careers than were their peers in the past. In fact, students who take both a strong academic curriculum and a vocational program of study (still only 13% of high school graduates) may have better outcomes than those who pursue one or the other (p. xvii).

The final activity in the SOL flyer/brochure activity described in this article is writing a reflection on the assignment. In the CTE teacher education program at

Virginia Tech, students are required to periodically write reflections on their learning experiences. This practice is informed by the metacognition theory which some authors have traced back to John Dewey's thoughts on reflections, based on his 1933 book titled “How We Think” (Graham and Phelps, 2003; Hedberg, 2009; Loughran, 2002; Rodgers, 2002). Dewey's work on this topic was carried forward by other scholars such as Donald Schon whose 1983 book entitled “The Reflective Practitioner: How Professionals Think in Action” is a seminal literary work to this day. In that book, Schon argued for an epistemology of practice that rested on the idea of reflection-in-action. In a subsequent book “Educating the Reflective Practitioner”, Schon (1987) explored the pedagogical implications of reflection-in-action with the hope that others would be primed by his thoughts to develop the phenomenon of reflective practice further, particularly with reference to education for reflective practice. The pedagogical value of metacognition in a teacher education program cannot be over-emphasized. As Johnson (1997) explained, metacognition, or strategic knowledge as it also called, which refers to one's awareness of one's own thinking processes, accounts for important higher order abilities such as self-monitoring, questioning, and evaluating. It has also been noted that the practice of reflection has a positive effect on a person's professional health and competence as well as ability to make sound professional judgment (Loughran, 2002). Furthermore, educators believe that students who are trained to reflect on their knowledge and learning experiences can take charge of their learning instead of being passive learners (Sidawi, 2007). Hopefully, as student teachers reflect on their experiences in the SOL flyer/brochure project, they will see that the process of identifying standards of learning, connecting the SOLs to CTE program competencies, reaching out to colleagues in other departments, and practicing collaboration in planning, delivering, and assessing skills that transcend disciplinary boundaries adds value to the CTE teachers' self-efficacy.

Conclusion

This article has described a CTE pre-service teacher preparation project requiring students to identify academic standards of learning relating to the competencies that they teach in their program areas with a view to encouraging interdisciplinary collaboration between CTE teachers and colleagues in academic disciplines. The assumption of the project is that it is of benefit to the cause of CTE, CTE teachers, teachers of other disciplines, students, and schools. With respect to the general cause of CTE, demonstrating that CTE can contribute significantly to academic growth as measured by SOLs should help in de-stigmatizing CTE which for many years has been regarded as the Cinderella of the education and training sector. If the real value of CTE is

recognized by all concerned, especially administrators who see it as underserving of school resources, CTE teachers will receive the necessary support for running vibrant CTE programs. Based on the assumption that the claims made by some cognitivists that real world contexts (such as the ones provided by CTE) have a positive impact on learning academic subjects are true, both students and teachers of academic disciplines should benefit from teachers' interdisciplinary collaboration. The sum total of these benefits should have an impact on the school's achievement records as well as level of morale.

Conflict of Interests

The authors have not declared any conflicts of interest.

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Appendix 1. Sample Lesson plan demonstrating inclusion of SOLs in the components of a lesson plan. Lesson plan: Economics and Personal Finance.

Teacher	Time required	50 min	Date
Unit title	Stress management		Level 9 th -10 th
Lesson title	The road to good credit: Credit ratings		
Tasks to be taught	Credit ratings, credit reports, credit history, credit scores		
Unit title	Credit and loan functions		
Tasks to be taught	Credit ratings, credit reports, credit history, credit scores		
Duty	Explain the need for a good credit rating		
SOLS Reference	EPF.13		
Overall objective	In an essay, the student will be able to explain the need for a good credit rating to 80% accuracy as determined by the essay evaluation rubric created by the instructor.		
Enabling objectives	<ol style="list-style-type: none"> 1. Describe the way credit is rated and the contents of a credit report 2. Identify what information is included in a person's credit record or history 3. Review credit rating scores and describing their implications 4. Describe ways to maintain a sound credit rating 5. Explain how a customer's credit rating affects eligibility for credit and employment 6. Explain how to access one's personal credit record before applying for credit, or, if denied credit, identifying reasons for a credit check 7. Describe steps for correcting errors in one's credit report. 		
Standards of learning	EPF.13 The student will demonstrate knowledge of credit and loan functions by <ul style="list-style-type: none"> - Evaluating the various methods of financing a purchase; - Analyzing credit card features and their impact on personal financial planning; - Identifying qualifications needed to obtain credit; - Identifying basic provisions of credit and loan laws; - Comparing terms and conditions of various sources of consumer credit; - Identifying strategies for effective debt management, including sources of assistance; - Explaining the need for a good credit rating; - Comparing the costs and conditions of secured and unsecured loans; and - Comparing the types of voluntary and involuntary bankruptcy and the implications of each. 		
Resources needed for lesson	<ul style="list-style-type: none"> - PowerPoint projector - Computer - Handouts - Grading rubric 		

Appendix 1. Contd.
Credit Reports

Personal information - your name, address, date of birth, and employer
 Credit account history - credit card company/lender, type of account, credit limit, balance, status, and two-year payment history
 Public records - bankruptcy, tax liens, and judgments
 Credit inquiries - creditor and date of inquiry

Show Slide 8: Credit Reports: Information Included (3 min)

Credit Reporting Agencies

Keeps records of a consumer's credit transactions and compiles credit reports
 Three credit reporting agencies in the United States
 Experian®, Equifax® and TransUnion®
 A credit reporting agency gathers information from various providers and supplies credit data on individual consumers
 Each credit reporting agency has its own formulas for calculating credit scores

Show Slide 9: Credit Reporting Agencies (3 min)

Maintaining a Positive Credit Rating

Pay your bills on time
 Mortgage, car payments, utilities, credit cards, bills, traffic tickets, doctor's bills, etc.
 20/10 Rule – “general rule of thumb”
 Avoid borrowing more than 20 percent of your annual net income
 Payments shouldn't exceed 10 percent of your monthly net income
 Avoid bankruptcies, foreclosures, or arrests
 Check your credit report at least once a year
 Don't overextend yourself

Show Slide 10: Maintaining a Positive Credit Rating (3 min)

Credit and Employment

Potential Employers do credit checks as part of a background check
 Must notify you in writing and get written authorization
 Credit history is important to employers because it an indication of how responsible you are

Show Slide 11: Credit and Employment (2 min)

Credit Records

AnnualCreditReport.com
 ONLY authorized source for the free annual credit report that's yours by law
 The Fair Credit Reporting Act
 Guarantees you access to your credit report for free from each of the three nationwide credit reporting companies — Experian, Equifax, and TransUnion — every 12 months

Show Slide 12: Credit Records (2 min)

Correcting Credit Report Errors

Tell the credit reporting company, in writing, what information you think is inaccurate
 Include copies (NOT originals) of documents that support your position
 By law, the credit reporting company must investigate the issue within 30 days
 When the investigation is complete, the credit reporting company must give you the results, in writing, and a free copy of your report if the dispute results in a change

Show Slide 13: Steps for Correcting Credit Report Errors (2 min)

In-class Handout

Why is a credit report important to a consumer?
 What does a credit report tell potential creditors?
 How is it possible a consumer might not have a credit history?
 Describe why it is important to check all three credit reports.
 What is a credit score?
 List three ways to build credit.
 What Web site can a person visit to receive a free credit report annually?
 What are the two rights consumers are given under the Fair Credit Reporting Act?
 In a paragraph or two, explain the need for a good credit rating.

Show Slide 14: Questions? (15 min)

Appendix 1. Contd.

Wrap up

Explain the need for a good credit rating

Class discussion

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