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Swegle, Robert W. ***An Analysis of an Interior System Training Manual for Utilization in the Mid-Central Illinois Regional Council of Carpenter Joint Apprentice Training Program***

Abstract

The purpose of this study was to identify the graduated apprentice perceived value of the Interior System Manual of the Mid-Central Illinois Regional Council of Carpenters – JATC for utilization in the course of study. The study looked to address two research questions, "How does the technical information described in the chapters of the Interior System manual support construction industry standards", and "What specific features of the Interior Systems Manual do the apprentices and members of the Mid Central Illinois Regional Council of Carpenters – JATC find useful in their effort to address meeting specific objectives and learning outcomes." The respondents were asked to complete a 69 item survey using a 5 point Likert Scale. A total of 92 respondents completed the survey.

Results indicated that the graduated apprentices were in agreement with the Interior System Manual supporting Construction Industry standards. Additionally, the apprentices indicated the specific features of the Interior System manual did address specific objectives and learning outcomes, specifically safety tips. Beyond their apprenticeship the Interior System Instructional Manual will be a valuable resource for the apprentices to refer to and reinforce their knowledge in the work they perform.

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Chapter I: Introduction

The craft of carpentry was organized several thousand years ago. Apprenticeship also had its origins in the past, and although it has undergone many changes over the years it has withstood the test of time as a means of training new workers in the skilled crafts.

The modern carpentry apprentice program can also be traced back to early times. It was a logical extension of a father-son relationship where by the knowledge and skill necessary to work at a given trade was passed on to the succeeding generation (California State Joint Apprenticeship and Training Committee, 1989). These trade skills and information were handed down in an unorganized manner. Some of the earliest apprenticeship programs were conducted by a group of tradesmen who worked together for their own mutual protection and interests for the advancement of the craft (United Brotherhood of Carpenters and Joiners of America, 1968). Organizations called guilds served to keep out those who were not wanted. The guilds concerned themselves closely with the indenturing and training of apprentices (United Brotherhood of Carpenters and Joiners of America, 1968). The apprentice was indentured to a master who provided training in the use of tools of the trade. These apprentices followed a rigid prescribed period of instruction. When the full period of instruction was served, the apprentice was granted the status of Journeyman and could work for another master for wages (California State Joint Apprenticeship and Training Committee, 1989).

The United Brotherhood of Carpenters and Joiners of America was organized on August 8, 1881 in Chicago, Illinois through the efforts of a small group of individuals who felt that the life of the working man could be improved (United Brotherhood of Carpenters and Joiners of America, 1968). Under the leadership of Peter J. McGuire, its founder, the organization grew to a total membership of 2,042 (United Brotherhood of Carpenters and Joiners

of America, 1968). As of 2010, the brotherhood stood at a half-million members and is still going strong (Then and Now, 2009). The United Brotherhood of Carpenters and Joiners of America constitutes one of the largest labor organizations in the trade union movement and has been created with significant changes that have taken place to promote the welfare of the workers. One change is by offering better training which develops courses that boost leadership and union-building skills to support the welfare of workers. Also, by rolling out new programs and developing the next generation of union-building curriculum (Tools for a Stronger Brotherhood, 2010).

The journeyperson and master carpenters were interested in securing competent workers coming into the trades (Galenson, 1983). The solution was to install a union-regulated apprenticeship training program that recommended a four year indenture be required. The specific limits in apprentice journeyman ratio was installed and adopted during the 1888 convention which consisted of three apprentices to one journeyperson (Galenson, 1983). In 1937, a major piece of legislation was passed by United States Congress, the Fitzgerald Act, also known as the National Apprenticeship Law (Bureau of Apprenticeship and Training, 2010). This law was designed to promote labor standards by the United States Secretary of Labor for apprenticeship training in cooperation with state agencies, and to bring together employees and labor for establishing Apprenticeship programs. At this time the Secretary of Labor established a National Advisory Committee and the Bureau of Apprenticeship and Training (Bureau of Apprenticeship and Training, 1991). BAT worked with state agencies to promote apprenticeship programs and provide technical assistance to industries in setting up programs (California State Joint Apprenticeship and Training Committee, 1989).

Title 29, Code of Federal Regulations (CFR), Part 29, outlines the requirements for registration of acceptable apprenticeship programs for federal purposes and set forth labor standards that safeguard the welfare of apprentices (Bureau of Apprenticeship and Training, 1991). From its beginning in 1881, the United Brotherhood of Carpenters and Jointers of America has provided for apprenticeship training (Galenson, 1983). The local joint apprenticeship committee operates its apprenticeship program under authority granted to it by the participating employer and employee organization (United Brotherhood of Carpenters and Joiners of America, 1968). This authority established a detailed statement setting forth national and local standards for carpentry referred to simply as the apprenticeship standards. These standards were adopted by the joint committee and approved a detailed statement setting forth United Brotherhood of Carpenters and Jointers of America (United Brotherhood of Carpenters and Joiners of America, 1968). The Apprenticeship Standards contains 25 sections with rules and regulations for conducting the apprenticeship program. It also spells out the duties and responsibilities of the local joint apprenticeship committee (United Brotherhood of Carpenters and Joiners of America, 1968). Apprenticeship is a system of on the job training combined with classes of related instruction.

During the United Brotherhood of Carpenters (UBC) 29th Convention, the membership authorized the establishment of a Department of Apprenticeship and Training to coordinate the apprenticeship functions of the union's subordinate bodies (Galenson, 1983). The Department of Apprenticeship and Training is under the direction and supervision of the Technical Director who is responsible to the Vice President of the UBC, as provided for in the union constitution (United Brotherhood of Carpenters and Joiners of America, 1968). At each convention a special Apprenticeship Committee hears all matters relating to apprenticeship and training. The

committee then reports any proposed constitutional changes, intended to strengthen and improve apprenticeship, to the convention.

United Brotherhood of Carpenters Apprentice programs were operated differently around the United States. Programs in larger metropolitan areas were tied in with the technical college districts where the related instruction classes were conducted. The smaller, less populated areas had programs in connection with the schools held in the evening at union halls. Eventually the UBC councils broke away from the school districts and established Joint Apprentice Training Centers operating apprentice and journeyman classes at their own facilities (D. Light, personal communication, June 3, 2011). The curriculum that was used was developed by the United Brotherhood of Carpenters (United Brotherhood of Carpenters and Joiners of America, 1982).

In the 1980's, the United Brotherhood of Carpenters developed a comprehensive course delivery system in Carpentry known as the Performance Evaluation Training System (PETS) which was used in this craft (United Brotherhood of Carpenters and Joiners of America, 1982). This visual instructional delivery method was designed to help the apprentice learn at their own pace. The instructional element for the trade was divided up into seven sections and the sections were broken down into skill blocks. Each skill block consisted of the apprentice viewing slides, reading manuals, and doing projects. All the skill blocks covered blueprint reading, safety, and the tools necessary for that block. When the apprentice completed the project, it would be graded by the instructor and then they could move on to the next skill block. Under this system, the instructor became a resource person. In each section, the apprentice would have to complete 80% of the skill blocks before they could move on to the next section (United Brotherhood of Carpenters and Joiners of America, 1982). Joint Apprentice Training Committee (JATC) programs around the United States and Canada during the 1980's, began to use other sources of

curriculum to train their members, due to the PETS curriculum being out dated and not meeting Industry Standards.

The PETS program was phased out and eventfully eliminated from use in the training centers. Objective-based education replaced the PETS system which became a more formalized type of instruction. The curriculum for each craft has a number of classes with a series of learning outcomes that was developed to cover the content. A portion of the instruction included in each class has a number of projects related to the learning outcomes on the topic. The projects were simulated job projects related to the learning outcomes where the apprentice would work together and use cooperative learning to master the skill.

With this change, there was a need to upgrade the curriculum to industry standards. This project was a top priority and became a strategic goal of the UBC to standardize the curriculum that was taught to the apprentices and journeyman in all the UBC training centers in the United States and Canada (United Brotherhood of Carpenters and Joiners of America, 2000). In 2003, the United Brotherhood of Carpenters International Training Center began developing new curriculum (Success Story, 2009). There was a need to upgrade the curriculum to match industry standards.

Since the duration of the curriculum project, over 47 instructional manuals have been developed in the various crafts. Thirty-nine more manuals are in the development phase at the time of this writing (Success Story, 2009). From all over the county, 175 UBC members with trade experience have served as Subject Matter Experts (Building the UBC'S Future, 2009). A Subject Matter Expert (SME) is a tradesperson who has learned and worked in the trade and in the field. At least three SME's worked on each manual with publishing professionals. The SME's produced the outlines and decided on the photos and diagrams to insert into the manuals.

Once approved, a professional writer edited the manual and then the SME's reviewed the manuscript for technical accuracy. An instructor's guide with outlines, lessons plans, tests, quizzes and power point presentations were developed to go along with the manual.

To keep this curriculum up to date with industry standards there were periodic reviews. The UBC owns the copyright to the entire curriculum that was developed and is one of the largest publishers in the United States. This process of developing curriculum is an ongoing process of the UBC.

Specialty trade contractors are the largest and most vital component of the construction industry they usually do the work of only one craft. The specialty trade contractors account for nearly 64% of total construction jobs in the construction industry (Manning & Mullins, 2006). One of these specialty trades is Interior Systems, which is a combination of gypsum board and light gauge metal framing. An aspect of Interior Systems work is drywall and metal framing. With the need for lower cost and easier to construct interior wall systems, the logical choice was to use drywall and metal framing. Consequently few instructional materials have been developed to meets the needs to train UBC members on Interior Systems. To address this need the UBC developed a series of instructional manuals on Interior Systems.

Importance of the Study

Skills, safety, and productivity have brought members fair wages, good benefits, and dignity in work and retirement for the members of the Mid-Central Illinois Regional Council of Carpenters-JATC (MCIRCC-JATC). The future of the Regional Council will be based on organizing and training the membership to gain the contractor base and competitiveness in the industry. For the union to grow, it will be critical that the apprenticeship curriculum is up to date and meeting industry standards in all the crafts. The future of this trade union, just like any job,

is the training. The training will result in members that are highly skilled and will be able to perform the work in a highly professional manner. New materials, products, and techniques of production have profoundly changed the industry and increased the demands of skilled craftsmen in all the skilled areas (California State Joint Apprenticeship and Training Committee, 1989).

Statement of Problem

MCIRCC-JATC attempts to meet the need for a skilled workforce in the industry and train qualified individuals for lifelong construction careers. Registered Apprenticeship programs help America's workforce with structured curriculum and on-the-job training in the construction crafts. There are a limited number of current instructional materials that address the training needs of the construction industry. Therefore, the United Brotherhood of Carpenters and Jointers of America have developed a number of Interior Systems manuals to address the training needs. There are a number of students presently using the Interior System Manuals, but no effort has been made to evaluate the effectiveness of these manuals. There are few instructional resources in Interior Systems that have been developed to meet the needs to aid the apprentice in learning the different types of material presented in school. The need existed to provide a reliable instructional source to train apprentices in the UBC training centers. With the advance in technology and to keep the curriculum up to the industry standards, it is necessary to research the perceptions of apprentice graduates to determine if the instructional manuals and the content are meeting the training needs for the members in the central Illinois area. This study will give direction to the trustees of the MCIRCC-JATC of the current manuals used to train UBC apprentices and members.

Purpose of Study

The purpose of this study is to identify the graduate apprentice's perceived value of the Interior System instructional manual at the Mid-Central Illinois Regional Council of Carpenters – JATC for utilization in the course of study. With this information, the Trustees of the JATC will be able to focus on long term improvements and changes based on the results.

Research Questions

This study addresses the following questions.

1. How does the technical information described in the chapters of the Interior System manual support construction industry standards?
2. What specific features of the Interior Systems Manuals do the apprentices and members of the Mid Central Illinois Regional Council of Carpenters – JATC find useful in their effort to address meeting specific objectives and learning outcomes?

Significance of the Study

Results of the study will allow MCIRCC - JATC, to evaluate the effectiveness of Interior System training manual. This will determine whether the manual is meeting the training outcomes for the apprentices being trained. The study can identify areas where the manual has both strengths and weaknesses. It may also provide input to future revisions of existing manuals.

Limitations of the Study

The following limitations were noted relating to this study.

1. The study is focused on the MCIRCC-JATC; therefore, the results are specific to this training center and may not be generalized by other UBC training centers.
2. The survey instrument was designed by this researcher; the conclusions stated may not be representative of the construction industry.

3. The survey results are limited to the opinion of and answers revealed by the respondents. Opinion and answers of respondents may be influenced by factors of this study.

Definitions

The following definitions apply to terms and acronyms commonly used throughout this document.

Apprentice. Person who is engaged in learning the trade covered by trade standards and who is under a written agreement hereinafter called an Apprenticeship Agreement with the local Joint Apprenticeship Committee acting as an agent of the employer and employee (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Apprenticeship committee (or joint committee). Joint Apprenticeship and Training Committee (JATC). It is comprised of equal numbers of labor and management representatives within the bargaining unit and is considered the sponsor of the apprenticeship program (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Apprentice training coordinator. Person or persons designated to administer the duties outlined in these Standards of apprenticeship (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

BAT. Bureau of Apprenticeship and Training, U.S. Department of Labor (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Contractor. Any employer of UBC members who is signatory to the Collective Bargaining Agreement(s) with the local union or Regional Council stipulated herein who is participating in the registered apprenticeship program (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Convention. Every five years to elect the general executive officers, vote on constitutional matters, hear industry updates, and debate policy. Convention committees, appointed by the General President, meet to address and report to the delegate body on critical issues (Galenson, 1983).

Employer. Any person, plant, firm, facility, or organization employing an apprentice (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

JATC. Joint Apprenticeship and Training Committee (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Journey worker. Individual who has sufficient skill and knowledge of a trade, craft or occupation, either through formal apprenticeship or through practical on-the-job experience, to be recognized by a State or Federal registration agency and/or an industry as being fully qualified to perform the work of the trade, craft, or occupation (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

National joint committee. It is comprised of representatives of the United Brotherhood of Carpenters and Joiners of America, the Associated General Contractors of America, the National Association of Home Builders, the Specialized Carriers and Rigging Association, and the Association of Wall and Ceiling Industries (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

OJT. On-the-Job Training (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

PETS. Performance Evaluated Training System, the official training program of the United Brotherhood of Carpenters (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Regional council. Controlling organization of local unions in a defined geographical area (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Related instruction. Organized and systematic form of instruction designed to provide the apprentice with knowledge of the theoretical and technical subjects related to their trade. This instruction will include classroom and manipulative training to reinforce the on-the-job training (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Signatory contractor. Any employee of UBC members who is signatory to Collective Bargaining Agreements worth the local union or Regional Council stipulated here in (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

UBC. United Brotherhood of Carpenters & Joiners of America (United Brotherhood of Carpenters and Joiners of America, 2005, p. 4-6).

Methodology

Data was collected using a four-page survey that incorporated demographic data, a 5-point Likert scale for responses ranging from strongly disagree to strongly agree. The Likert scale questions included eight sections consisting of statements pertaining to the usefulness of the Interior System Manual to apprentices and members of the Mid-Central Illinois Regional Council of Carpenters-JATC. The 73-item survey was designed by the researcher for the purpose of this study. The instrument was reviewed for content by two signatory contractors and two experienced journeymen who work at the trade of Interior Systems Carpenters. The Institutional Review Board (IRB) for the Protection of Human Subjects approved this instrument on October 17, 2012. The survey was administered to 189 graduated carpentry apprentices from the MCIRCC-JATC in 2009- 2012. Succeeding chapters, a review of the literature results of the research data are presented along with conclusions and recommendations for future research.

Chapter II: Literature Review

This chapter provides a literature review that includes the impact of instructional manuals, quality of instruction, interior system materials, and types of learning needed to acquire highly trained skilled workers in today's workforce. A review of literature pertaining to the quality of manuals revealed a number of ways they can be utilized so apprentices can be transitioned from apprentice to journeyperson working out in the field.

One study conducted by Duffy (1985), showed the perception of the effectiveness of materials identifying the factors contributing to the difficulties in producing a manual. Findings showed that poor manuals arise from some set of inadequacies in the publication process and that if there is to be an improvement in the quality of the manuals that improvement will only arise from a modification in the production system. The focus in the design of technical manuals must shift from the product to the process of developing the manuals and to the goals of the design process (Duffy, 1985).

Teaching Strategies for Apprenticeship in Workforce Development

The role of an apprentice is to work for someone for a specific amount of time in return for instruction in a certain trade. In the United States, vocational preparation is widely considered as one of the most important functions of education. No longer can persons hope to find employment in business and industry without some kind of education and training (Gallington & Giachino, 1977). An apprenticeship gives an individual the training they will need to prepare them for a useful occupation. With ambition, aptitude, and hard work the apprentice will reap the rewards they have set out to achieve after their apprenticeship.

America needs large numbers of highly skilled workers. The economy depends on workers who are knowledgeable and who know how to troubleshoot and problem solve

situations. To succeed, manufactures and craftsmen need to be better trained, be more creative, and be highly skilled (Lamos, Simon, & Waits, 2010). America needs a new kind of craftsman to be trained through large scale collaborations between industry and education on new products and applications. It seems reasonable that the union trades can provide the research and application essential to apprenticeship training. The union trades are in the forefront of change and can be very effective in providing relevant training.

UBC training centers work with manufactures and owners of companies to provide the most up-to-date training in the industry and continue research and development on various types of products. Curriculum content is based on the industry standards and developed in close consultation with industry (Lamos, Simon, & Waits, 2010). The United Brotherhood of Carpenters and Jointers of America have made this a strategic priority. To make the curriculum up to date and meet industry standards instructional manuals have been developed to meet the need of the industry.

Working and learning is independent throughout life. Research confirms that the "focus in teaching and learning should be on the individual's active construction of knowledge" (Stevenson, 1994). Because the focus is on the learner, vocational education should be conceptualized as a learning process rather than a teaching process (Stevenson, 1994). Apprenticeship has all the features needed to prepare workers for occupations that require extended study to attain competence (Lewis & Stone, 2011).

Most students, over 90 percent, can master what we have to teach them, and it is the task of instruction to find the means which will enable our students the subject under considerations (Bloom, 1968). A basic task is to determine what is meant by mastering the subject and to

search for methods and materials which will enable the largest proportion of students to attain such mastery (Bloom, 1968).

The average adult in the United States is unable to read above the eighth-grade level (Doak, Doak, & Root, 1996). The concept of readability is not new, and can be described as the "characteristics of written material that make that material 'easy' or 'difficult' to read" (Kahn & Pannbacker, 2000). Readability can be determined by a number of different formulas, most of which use sentence length and word length as primary factors. In fact, adults generally prefer material that is easy to read over material that is challenging to read (Doak et al., 1996). This strategy was used when designing and writing the Interior System Instructional manual. Making sure not only the words that make up the text, but also the sentence structure is appropriate for the apprentices to understand and is meaningful.

Paivio's Dual Coding Theory of memory proposes that information is encoded within one or both of two distinct memory systems, one specialized for verbal information and the other for images (Clark & Paivio, 1991). Some apprentices need drill-type and practice learning, step by step, or frequent reinforcement when learning the material. To master the learning process is to gain a quality of instruction depending on the instructor and the materials being used. Also, this improves the quality of instruction in relation to the ability of each student to understand the instruction. The instructor needs to realize that mastering learning is the key to a successful apprentice. Mastering an apprenticeship is a combination of on the job training and related classroom and shop instruction. When this is accomplished an apprentice is ready to enter the workforce and has mastered the learning.

Metacognition is defined as knowledge about cognitive knowledge used to regulate thinking and learning (Bruning, Norby, & Schraw, 2011). Instructors need to know how to

create assignments and assessments that are challenging and address real-world experiences. The apprentices will use schema (former knowledge), strategies, and metacognition to complete tasks and problem-solve to help demonstrate what they have learned. These clever ways of remembering will enable an apprentice to use throughout their continuing learning process. School learning must be successful and rewarding as one basis for insuring that learning can continue throughout one's life as needed.

There is little doubt that humans have extraordinary capabilities for remembering visual information, (Bruning et al., 2011). There is no doubt an apprentice learns best after seeing and hearing the information, than just through formal learning to fulfill whatever his/her apprentice training may be in. During hands-on experiences, the apprentice uses the sense of touch, whether it is the wood or floor materials, such as, carpet, tile or even just the feel of the tools. Their sense of sight is used whether they're reading a blueprint or modeling an instructor's presentation. Auditory skills would be listening to what the instructor has to tell you or just the sounds of the machinery. All of these sensory experiences are vital when as apprentice is working in a hands-on environment to learn the trade. There is another way someone can help with their thought process by using learning strategies.

One type of strategy an apprentice might use is imagery. As mentioned earlier, in the Dual Coding Theory, an apprentice can conjure up an image of a staircase as an instructor is explaining the process on how to lay them out. Imagery has considerable value in helping make information memorable (Bruning, et al., 2011).

Any form of learning strategy will enhance a student's learning. Whichever strategy a student uses will depend on them, picking the one that works the best for them will help them to organize and remember information. All students have the potential to become good strategy

users if they are helped to use them correctly (Bruning, et al., 2011). Apprentices using these strategies learned will be able to analyze and problem-solve in the jobs they will be addressing in the real-world.

Quality of Instruction/Instruction Method

Teaching and learning is a process that includes many variables. These variables interact as learners work toward their goals and incorporate new knowledge, behaviors, and skills that add to their range of learning experiences. The important factors in the apprentice mastering their skill will depend on the teacher, the learner, and the environment.

Effectively designed and well written manuals help individuals do their work correctly, efficiently, uniformly, and comfortably. Effective manuals have the following characteristics: they are well written, they are attractively designed, and they are formatted to make it easy for users to follow. Also, instructions are accurate, and they are illustrated appropriately to enhance understanding (Casady, 1992). Carroll (1963) defines the quality of instruction in terms of the degree to which the presentation, explanation, and ordering of elements of the task to be learned approach the optimum for a given learner. Using manuals and other types of materials is one form of quality of instruction to help instructors teach the apprentice. Manuals vary in the way they explain an idea or process. Also, using workbooks, power point presentation, videos, cd's, and links to various websites, will enable an apprentice who has trouble grasping the ideas from manuals to use these other forms of materials to visually and auditory to understand and learn the material (Bloom, 1968).

Interaction between the instructor and student (O'Donnell, 1993), when the student uses training materials such as handouts and a manual, has great impact on training. The printed material the instructor employs plays a critical part in their teaching. Teachers shape the learning

experiences that produce confident workers, who are ready to perform their job in the workplace. The ability to create a classroom environment in which the relationship among teachers and learners will enhance everyone's learning experience. It is essential and will ultimately affect apprentice's motivation and learning (Sass, 2011).

Modeling from the instructors to the novice at the beginning of their apprenticeship will help them realize that a new skill can be mastered (Bandura, 1997). As their apprenticeship continues, modeling from peers will also be effective. Research conducted by Schunk and colleagues (Schunk, 1983, 1987; Schunk & Cox, 1986) says attribution feedback provided to students while they are engaged in a task increases self-efficiency and performance. Feedback about effort frequently improved task persistence, especially when it was given early in the learning cycle.

There are two aspects to consider when simplifying any document: design and writing. Design refers to the visual elements of the manual. The goal is to create something that is visually appealing, uncluttered, and easy to follow. Well designed and appropriately written education materials, such as instructional manuals, can augment other educational materials and improve apprentice learning.

Using visual aids for auditory presentations and discussing visual materials is a reasonable approach to increasing the likelihood that instructional materials will be perceived (Bruning, et al., 2011). Visual realism contributes substantially to the recall process by providing familiar, functional cues and will aid the leaner in retrieving information.

Interior System Materials

The next section of the literature review relates to the technical content that is included in the carpentry apprenticeship curriculum. This section provides the reader with a foundation of which the instructional materials under review is based.

As with any job, the materials used depends on the outcome to achieve. The right materials needed to complete an Interior System project will enhance the overall undertaking of the job. Depending on the Interior System job an apprentice will be doing will factor in the different materials used. As described by Gallington and Giachino (1977), material which helps a student form correct judgments and make proper decisions in performing the jobs or operation is technical information.

Light gauge framing was implemented during the 1950's. Metal framing is referred to metal or steel stud and track. This system is used primary in noncombustible commercial construction (Dietrich Metal Framing, 2007). Pressed metal studs were first used in the Lath and Plaster industry during the 1940's. As the need grew for lower cost, easier to construct interior wall systems, the logical choice was to use drywall and light gauge framing. The first metal studs used were a heavy gauge and clumsy by today's standards (California State Joint Apprenticeship and Training Committee, 1982).

Light and heavy gauge metal has become the most commonly used material in building products today and is a staple item in commercial construction. Due to the simplicity, fire rating and usability, metal framing is the choice used to build with. Steel is the choice material to use when erecting commercial buildings. The majority of buildings being built today are using heavy and light gauge metal framing, and this is why training programs are implementing curriculum that addresses this issue.

Dietrich Metal Framing is the world's leading producer of Light Gauge Framing. Metal framing is used in noncombustible commercial construction. Metal framing can be used throughout the structure, including non-load bearing interior walls, lad beading exterior walls, floor joists, curtain walls and roof trusses. Metal framing is corrosion resistant and protected with a galvanized coating that protects the steel from rusting (Dietrich Metal Framing, 2007).

The two primary applications are interior non-load bearing and curtain wall on load bearing framing (structural framing). Approximately 60% of metal studs used in the United States are Interior Non load bearing wall partitions (Dietrich Metal Framing, 2007).

Metal framing is available in many sizes and gauges (gauges refer to the metal thickness). Most interior non-load bearing metal framed walls are the lightest gauge or thinnest material available. The wall assemble consist of a metal track on the top and bottom and studs are spaced on center spacing. Once installed and covered with gypsum wall board makes a very strong and durable wall.

Structural framing members are used to construct exterior walls and residential in certain wall assemblies (the outer skin of commercial buildings or residential). These members also are used for floor joists and ceiling joists. In addition, structural framing members also are used in combination to produce roof trusses, and a variety of sophisticated assemblies (Dietrich Metal Framing, 2007).

Gypsum dates back some five thousand years ago. Gypsum is a rock, which is crushed, and is ground into a powder. Water is applied, and it becomes a workable compound. The compound can be applied to make a smooth surface finished on walls. It is used for the inner core of the gypsum board and is used as a soil nutrient. In 1898, Sackett developed a method by inserting plaster between three layers of heavy felt paper that became known as plaster board.

The first plaster board developed was 1/4" thick, 32" wide, and 36" in length. It was hard and awkward to work with but it was fireproof. The United States Gypsum Company, founded in 1901, purchased the Sackett Plaster Board Company in 1909. United States Gypsum introduced 3/8" and ½" thick boards and developed a highly important folded edge (United States Gypsum Co., 1956).

In 1915, the two paper board was developed which led to the discontinuation of the three paper Sackett board. In 1917, United States Gypsum Company introduced Sheetrock gypsum panels and during World War I the sheetrock brand gypsum panels were used for building barracks. It was preferred because of its fire resistance and speed of erection. In World War II, Sheetrock brand gypsum panels were used for war projects, seventy times the volume used in World War I.

When gypsum board was first produced, it was solid core 3/8" board. In the 1920's a method was perfected in which bubbles of foam were inserted into the core making a more porous cellular structure and reducing board weight. The introduction of fibrous material greatly increased the strength of the board, reduced breakage and provided a better nail holding power and cutting edge. The size of the gypsum board increased from 32" to 48" which was more practical for standard stud spacing. Length was increased from 8' to various lengths to accommodate standard ceiling heights and room widths. The thickness of the gypsum board increased from ¼", ⅜ ", ½" and ⅝" to meet wall strengths and fire ratings requirements (United States Gypsum Co.,1956).

The Gypsum Construction Handbook (United States Gypsum Co.,) was first published by the United States Gypsum Company in 1904. For more than a century and through several editions, the book has become a trusted standard for use in apprenticeship training. The

Handbook covers new construction, repair and remodeling and includes: framing drywall, veneer plaster joint treatment, plaster finishing interior cement board ceilings and conventional plaster. In the latest edition chapters on sustainable construction methods and products, building movements, fire resistance, heat transfer, sound transmission, and vapor/moisture control have been added. System descriptions - together with full data on products, accessories, tools, equipment and applications - help plan and estimate projects and ensure compliance with performance criteria. Cost and time saving techniques keep the work on budget (United States Gypsum Corporation, 2008).

In the beginning, with use of the drywall and metal systems, the wall board was nailed on to the studs with nails, and the system had many problems. With the appearance of the drywall screw and the screwable metal stud many problems were eliminated. This system has been accepted everywhere because of the speed, ease, and fire ratings that can be achieved (California State Joint Apprenticeship and Training Committee, 1982).

Another aspect of the Interior System is the Suspended ceiling. The development of the suspended ceiling came out in the early 1950's (United States Gypsum Corporation, 2008**)**. The conventional ceiling was a simple ceiling that provided fire protection. The suspended ceiling offered access to plumbing, electrical and mechanical systems. Acoustical ceiling provides options for acoustical, fire protection, lighting systems and security networks. The components are suspended grid and acoustical panels or tile. The composition of each ceiling can depend on the end use of the application (Stahl, 1999).

Ceiling System Handbook, (Stahl, 1999) contains 13 chapters and more than 200 pages of illustrations and self instruction material and was published in 1999 under the direction of the Ceiling and Interior Systems Construction Association. The book has been field tested by

training experts and is a major source for apprenticeship training of ceiling installers. This book contains chapters on tools, blue print reading, “stick up/glued on” acoustical tile ceilings, exposed grid ceilings, concealed assessable tile systems and metal ceilings. It imparts information on installation procedures for each type of ceiling system mentioned.

This literature review presented the importance of quality instruction, different types of learning and the materials used on Interior System projects. All of these are essential to attain the highly trained workers needed in today’s workforce. Chapter Three will present research methodology.

Chapter III: Methodology

The purpose of this study was to determine the perception of graduated carpentry apprentices from the Mid-Central Illinois Regional Council of Carpenters – JATC. The goal was to collect data on the perception of the journeyperson on the instructional value of the Interior System manual used at the Mid-Central Illinois Regional Council of Carpenters – JATC in the course of study. With this information, the Trustees of the JATC will be able to focus on long term improvements and changes based on the results. This chapter includes subject selection and description, instrumentation, data collection procedures, data analysis and limitations.

Subject Selection and Description

For any individual to apply to the MCIRCC-JATC apprenticeship program they must meet minimum qualifications; minimum age of 17 years of age, high school graduate, or have a GED, possess a valid driver's license, qualify by obtaining a score of 70% or higher on the qualifying math test for apprenticeship applicant developed and validated by the Local JATC, and also drug testing is required upon entry (National Joint Apprenticeship Training Committee, 2006).

The population selected for this study was limited to graduated apprentices of the four year registered apprenticeship program of the Mid-Central Illinois Regional Council of Carpenters – JATC. The graduated carpentry apprentices who turned Journeymen used the manual for related instruction while attending classes at the JATC. The journeymen who graduated from the years 2009, 2010, 2011 and 2012 were selected for this study. A list of the graduated apprentices was obtained from the data base of the MCIRCC-JATC. All apprentices who graduated and are members in good standing with the Mid Central Illinois Regional Council of Carpenters were included in the sample. All graduates meeting the criteria were included to

obtain a good quality sample size. Based on statistics from the data base of the MCIRCC-JATC, there were a total number of 32 graduates for 2009, 38 for 2010, 66 for 2011 and 53 for 2012 for a total available population of 189 carpentry apprentice graduates.

Based on the demographic profile of past graduates from the MCIRCC - JATC from 2009-2012, the respondents in the study would potentially range from 20-50 years of age. All respondents worked a specific percent of time performing Interior Systems. Lastly, each individual was asked what type of contractor they were presently working for.

Instrumentation

Approval from UW-Stout's Institutional Review Board (IRB) was granted for the Protection of Human Rights and granted on October 17, 2012 (See Appendix B). A cover letter introducing the researcher and an explanation of the study was followed by an invitation to all graduate carpentry apprentices to participate in the study, time consent and confidentiality. Additionally, with this information, the Trustees of the JATC will use the data from this study for future training to the membership of the Regional council (See Appendix C). The survey developed as the data collection tool consisted of four pages (See Appendix D). The Interior System Instructional manual that is used at the MCIRCC-JATC was developed by build the book process. Build a book combines chapters from different manuals into one manual. Four of the Interior system manuals that were developed by the UBC International Training Center were used in this process. The 11 chapters that made up the manual were picked from the manuals based on the type of work that is performed in Central Illinois. Under the main heading the subheadings were then developed which were turned into questions used in the survey.

Page one of the survey included information on the purpose of the study, IRB approval, time commitment to respond to the study, the right to withdraw, and contact information of the

researcher. Also, part of page one, and pages two and three included a 73-item survey using a 5-point Likert scale. The survey consisted of statements pertaining to the usefulness of the Interior System manual used to train apprentices and members of the Mid Central Illinois Regional Council of Carpenters – JATC. The Likert scale included responses ranging from strongly disagree, disagree, neutral, agree, strongly agree and non/applicable for each of the statements listed. Page four included questions on demographic data concentrating on year of graduation, age group, percent of time you have worked performing Interior Systems and what type of contractors you are presently working for.

The instrument was designed by the researcher; it has no established reliability as the survey was designed specifically for this study. The research advisor reviewed the instrument to establish face validity. The instrument was reviewed for content validity by a panel of experts consisting of two signatory contractors and two experienced journeymen who work at the trade as Interior System mechanics.

Data Collection Procedures

After receiving approval from the IRB for Ethical Research on Human Subject on October 17, 2012 from the University of Wisconsin-Stout, 189 carpentry graduated apprentices from the MCIRCC-JATC in 2009, 2010, 2011 and 2012 made up the pool of participants to be included in the survey. From the two largest locals, Peoria and Champaign, Illinois, with a total of 115 were mailed an invitation to participate in the study at their home locals (union hall) on specific dates and times. Due to the poor response rate of 18 participants in this particular manner, the researcher mailed the survey to the remaining 171 participants of the study on November 12, 2012. Each graduate received information about the purpose of the study, contact

information from the researcher, time consent and confidentiality. A code was embedded in the survey for each respondent to identify the year of graduation and local of each respondent.

The survey was mailed to the graduate apprentice's last known address listed in the data base of the MCIRCC-JATC. Surveys were requested to be returned in three weeks of the mailing, with a return date of December 7, 2012 being requested. Enclosed was a stamp self-addressed envelope for return of the survey to the researcher. Three weeks after the initial mailing, with a response rate of 38%, the researcher made a telephone call to all the non-respondents to the survey in efforts to increase the response rate. This resulted in a response rate of 48%.

Data Analysis

The Statistical Program of Social Science (SPSS) version 20, 2011, was used to analyze the data. Descriptive statistics were run on the data using median, average, standard deviation, and quartiles on the sub-score. Research question one asked how is the technical information described in the chapters of the Interior System Manual support construction industry standards. In each of the eleven chapters of the Interior System manual there were a series of statements. Questions 1-54 asked to evaluate the content of the chapters using the 5-point Likert scale. In research question two, numbers 55-65, members were asked what specific features of the Interior System Manual do they find useful in their effort to address meeting specific objectives and learning outcomes. The last four questions, 66-69, pertained to the final review of the manual.

Limitations

The survey for this study could potentially yield bias which limits generalization of the results. As discussed earlier, this study focused to identify the graduate apprentice's perceived instructional value of the Interior System manual at the Mid-Central Illinois Regional

Council of Carpenters – JATC for utilization in the course of study. Therefore, results are specific to the training center in central Illinois and may not be generalized by other UBC training centers outside the territorial area of the Mid-Central Illinois Regional Council of Carpenters - JATC.

The study focused on the Interior System Manual for utilization at the Mid-Central Illinois Regional Council of Carpenters - JATC course of study. The survey instrument was designed by the researcher; therefore the survey results are limited to the opinions and answers revealed by the respondents, the graduated carpentry apprentices of 2009-2012. Another limitation may be the 98 potential respondents (52%) not returning the survey.

Summary

The intent of the study was to evaluate the perceived instructional value of the Interior System Training Manual at the Mid-Central Illinois Regional Council of Carpenters – JATC in the course of study. Ninety two respondents completed a 73-item survey that provided data for the study. All the respondents were graduated carpentry apprentices, between 2009-2012 and were in good standing with their local union from the Mid-Central Illinois Regional Council of Carpenters – JATC.

Chapter IV: Results

The purpose of this study was to identify the graduate apprentice's perceived instructional value of the Interior System manual at the Mid-Central Illinois Regional Council of Carpenters – JATC for utilization in the course of study. With this information, the Trustees of the JATC will be able to focus on long term improvements and implement changes based on the results.

Description of Population

The demographic characteristics of the sample consisted of 189 graduate apprentices. Data was collected about the participants including year of graduation, and age. In addition participants identified the percent of time worked performing Interior Systems and what type of contractor they were working for. Demographic questions were completed on all surveys.

The method used for data analysis in this study was descriptive statistics - measures of central tendency (mean, median), and measures of variability (range, standard deviation, variance). The data collected was all statistically analyzed and represented in descriptive statistics, percentages, and graphs.

Demographic Information

The population for this study comprised of 189 apprentices from the MCIRCC- JATC who graduated and turned journeyperson in the years 2009, 2010, 2011 and 2012. A list of the graduated apprentices was obtained from the data base of the MCIRCC-JATC. A total of 92 respondents returned the survey by December 14, 2012. This yielded a response rate of 48%.

Year of graduation the respondents in the study, and are shown in Table1 below. Of the 92 graduates who completed the survey, 35 respondents (38%) graduated in 2012, 29

respondents (31.5%) graduated in 2011, 15 respondents (16.3%) graduated in 2010 and 13 respondents (14.1%) graduated in 2009.

Table 1

Respondents Year of Graduation

Year	Frequency (N=92)	Percent
2012	35	38%
2011	29	31.5%
2010	15	16.3%
2009	13	14.1%
Total	92	100.0

Of the 92 respondents who completed the survey, 7 respondents (7.6%) represented 20-25 age grouping, 38 respondents (41.3%) represented 26-31 age grouping, 33 respondents (35.9%) represented 32-37 age grouping, 7 respondents (7.6%) represented 38-43 age grouping and 7 respondents (7.6%) represented 44-49 age grouping. See Table 2 for age of respondents.

Table 2

Age of Respondents

Age	Frequency (N=92)	Percent
20-25	7	7.6%
26-31	38	41.3%
32-37	33	35.9%
38-43	7	7.6%
44-49	7	7.6%
Total	92	100.0

Responses to the questions regarding percent of time apprentices have worked performing Interior Systems is shown in Table 3 below. Of the 92 respondents 13 (14.1%) worked 100% performing Interior Systems, 21 (22.8%) worked 75% performing Interior Systems, 21 (22.8%) worked 50% performing Interior Systems, 16 (17.4%) worked 25% performing Interior Systems and 21 worked (22.8%) under 25% performing Interior Systems.

Table 3

Worked Performing Interior Systems

Work Performing Interior Systems	Frequency (N=92)	Percent
100%	13	14.1%
75%	21	22.8%
50%	21	22.8%
25%	16	17.4%
Under 25%	21	22.8%
Total	92	100.0

Responses to the questions regarding percent of time for type of contractor they were presently working for are shown in Table 4. Of the 92 respondents 45 (48.9%) worked for a General Contractor, 11 (12%) worked for a Carpentry Contractor, 20 (21.7%) worked for an Interior System Contractor and 16 (17.4%) worked for a Specialty Contractor.

Table 4

Contractors Presently Working For

Type of Contractor	Frequency (N=92)	Percent
General Contractor	45	48.9%
Carpentry Contractor	11	12.0%
Interior System Contractor	20	21.7%
Specialty Contractor	16	17.4%
Total	92	100%

Data Analysis

The two research questions were designed to determine the perceived value of the Interior System Instructional Manual at the MCIRCC-JATC for utilization in the course of study.

Research Question 1: Technical Information in the Instructional Manual. The first research question sought to answer the graduate apprentice's opinion of the technical information that was described in the chapters of the Interior System Manual as it supports construction industry standards. It is categorized into eleven different sections: Materials, Job Planning, Shaft Wall and Area Separation Walls, Metal Framing, Drywall Application Materials, Measuring and Cutting Drywall, Soffits, Job Planning, Ceiling Components, Codes and Standards, and Exposed Systems of the manual.

The first survey question related to research question one covers materials. Materials describes the uses and correct handling and storage of metal wall framing materials used in interior systems carpentry.

The respondents were asked to rate each statement, pertaining to materials, how they think it supports construction industry standards. Data from these responses for each factor were calculated using frequency, mean, median and standard deviation. In summary,

- 94.6% agree or strongly agree that the Stud and Track section of the chapter supports the Industry Standard.
- 87.9% Agree and Strongly Agree the Fasteners section was up to Industry Standards
- 82.6% Agree and Strongly Agree the Ceiling and Wall Furring section was relevant to Industry Standards
- 79.9% Agree and Strongly Agree that Additional Furring Components satisfactorily supports Industry Standards

- 74.8% Agree and Strongly Agree that Handling and Storage of Metal Framing Material was up to date with Industry Standards.
- 71.5% Agree and Strongly Agree that Finish Beads was up to Industry Standards.

The mean ratings for Materials showed an agreement that ranged from 3.99 to 4.46 with an overall mean of 4.16. There are two components, from Materials, that had median ratings of 5.00, Stud and Track, and Fasteners. Stud and Track had the highest mean with 4.46 and the lowest standard deviation of .69. Fasteners had a mean of 4.37 and a standard deviation of .76.

Therefore, considering the mean values relative to the standard deviation, respondents agree or strongly agree that the Materials section had a high level of consensus supporting the Construction Industry Standards. Table 5 presents the responses related to the Materials content in the Interior Systems manual.

Table 5

Content Related to Materials

Item	Strong Disagree	Disagree	Neutral	Agree	Strong Agree	Mean	Median	Std. Dev.
Stud and Track	1(1.1%)	0%	4(4.3%)	38(41.3%)	49(53.3%)	4.46	5.00	.69
Ceiling and Wall Furring	1(1.1%)	2(2.2%)	13(14.1%)	41(44.6%)	35(38.0%)	4.16	4.00	.83
Additional Furring Components	1(1.1%)	7(7.6%)	17(18.5%)	34(37.0%)	33(35.9%)	3.99	4.00	.83
Finish Beads	2(2.2%)	7(7.7%)	17(18.7%)	31(34.1%)	34(37.4%)	3.99	4.00	.98
Fasteners	(0%)	2(2.2%)	9(9.9%)	33(36.3%)	47(51.6%)	4.37	5.00	.76
Handling and Storage of Metal Framing Material	3(3.3%)	4(4.4%)	16(17.6%)	30(33%)	38(41.8%)	4.05	4.17	1.04
Overall	8(1.5%)	22(4%)	76(13.8%)	207(37.7%)	336(43%)	4.16	4.17	.72

Job Planning was the second question in the survey related to research question one. Job Planning, deals with site inspection, the basics of blueprint reading and the estimating of the materials needed to effectively plan an Interior System job.

Respondents were asked to rate each statement, related to Job Planning, as it supports construction industry standards. In summary,

- 91.3% Agree and Strongly Agree that the Layout section supports Industry Standards
- 83.6% Agree and Strongly Agree that the Reading Prints section of the chapter was up to Industry Standards
- 80.0% Agree and Strongly Agree that the Site Inspection section was relevant to Industry Standards
- 68.9% Agree and Strongly Agree that the Estimating section was satisfactorily up to Industry Standards;

The mean ratings for Job Planning showed a strong agreement that ranged from 3.82 to 4.48 with an overall mean of 4.19. There were two components of Job Planning that had median ratings of 5.00, Reading Prints and Layout. Layout had the highest mean, with 4.48 and the lowest standard deviation of .65. Reading Prints had a mean of 4.29 and a standard deviation of .98.

Therefore, considering the mean values relative to the standard deviation, respondents agree and strongly agree that the Job Planning section had a high level of consensus supporting the Construction Industry Standard. Table 6 presents the responses related to the Relevance of Content to Job Planning in the Interior Systems Manual.

Table 6

Relevance of Content to Job Planning

Item	Strong Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Reading Prints	3(3.3%)	2(2.2%)	10(11.0%)	27(29.7%)	49(53.85%)	4.29	5.00	.98
Site Inspection	1(1.1%)	2(2.2%)	15(16.7%)	37(41.1%)	35(38.9%)	4.14	4.00	.86
Estimating	4(4.4%)	7(7.8%)	17(18.9%)	35(38.9%)	27(30.0%)	3.82	4.00	1.09
Layout	(0%)	(0%)	8(8.7%)	32(34.8%)	52(56.5%)	4.48	5.00	.65
Overall	8(2.3%)	11(3.1%)	42(11.8%)	231(36.9%)	163(45.9)	4.19	4.25	.71

Shaft Walls and Area Separation Walls was the third question in the survey related to research question one. This question addresses metal-framed shaft wall systems designed to isolate elevators, stairwells, and mechanical shafts. Area separation walls, is also described which prevents the fire and sound between dwellings. The fire and sound rating, building codes, layout and installation procedures are also covered.

Respondents were asked to rate a set of statements, pertaining to Shaft Walls and Area Separation Walls, according to construction industry standards. In summary,

- 86.9% Agree and Strongly Agree that the Shaft Walls and Area Separation Walls section of the chapter support industry standards.
- 83.6% Agree and Strongly Agree that Area Separation Walls section was relevant to industry standard.
- 76.1% Agree and Strongly Agree that Fire and Sound Wall was satisfactorily up to industry standards.

The mean rating for Shaft Walls and Area Separation Walls showed a strong agreement that ranged from 4.15 to 4.29 with an overall mean of 4.23. The four components of Shaft Walls

and Area Separation Walls had a high median rating of 4.00 with an overall median rating of 4.00. Materials had the highest Mean of 4.29 and the lowest Standard Deviation of .69.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Shaft Walls and Area Separation Walls had a high level of agreement supporting construction industry standards. Table 7 presents the responses to Shaft Walls and Area Separation Walls content in the Interior Systems Manual.

Table 7

Shaft Walls and Area Separation Walls

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Fire and Sound Ratings	1(1.1%)	4(4.4%)	16(17.6%)	29(31.9%)	41(45.1%)	4.15	4.00	.94
Materials	(0%)	(0%)	11(23.2%)	41(45.1%)	38(41.8%)	4.29	4.00	.69
Shaft Walls	(0%)	1(1.1%)	13(14.3%)	38(41.8%)	39(42.9%)	4.26	4.00	.74
Area Separation Walls	(0%)	3(3.3%)	12(13.2%)	40(44.0%)	36(39.6%)	4.20	4.00	.79
Overall	1(.3%)	8(2.2%)	52(14.3%)	148(40.8%)	154(42.4%)	4.23	4.00	.65

Metal Framing, was the fourth question of the survey related to research question one. Metal Framing deals with the proper layout and installation procedures for metal frame walls, windows, and doors and the proper technique for cutting metal studs and track. Also covered is metal track and stud installation at corners and with different types of walls.

Respondents were asked to rate a set of statements, pertaining to Metal Framing, according to how they support construction industry standards. In summary,

- 92.4% Agree and Strongly Agree that Stud and Layout and Installation section of the chapter support industry standards

- 88% Agree and Strongly Agree that Layout Procedures for a Metal Stud Partition section was relevant to industry standard
- 87% Agree and Strongly Agree that Layout for Doors and Windows, Track Installation, and Metal Stud Cutting satisfactorily support industry standards.

The mean rating for Metal Framing showed a strong agreement that ranged from 4.17 to 4.48 with an overall mean of 4.35. Three components from Metal Framing had a high median rating of 5.00 with an overall median rating of 4.60. Layout Procedures for a Metal Stud Partition had a Mean of 4.43 and the lowest Standard Deviation of .73.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Metal Framing section had a high level of agreement supporting construction industry standards. Table 8 presents the responses related to Metal Framing content in the Interior Systems Manual.

Table 8

Metal Framing

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Layout Procedures for a Metal Stud Partition	(0%)	1(1.1%)	10(10.9%)	29(31.5%)	52(56.5%)	4.43	5.00	.73
Layout Doors and Windows	(0%)	3(3.3%)	9(9.8%)	34(37.0%)	46(50.0%)	4.34	4.50	.79
Metal Stud Cutting	2(2.2%)	3(3.3%)	10(10.9%)	39(42.4%)	38(41.3%)	4.17	4.00	.91
Track Installation	2(2.2%)	3(3.3%)	7(7.6%)	33(35.9%)	47(51.1%)	4.30	5.00	.91
Stud Layout and Installation	1(1.1%)	1(1.1%)	5(5.4%)	31(33.7%)	54(58.7%)	4.48	5.00	.75
Overall	5(1.1%)	11(2.4%)	41(9%)	166(51.5%)	237(51.5%)	4.35	4.60	.71

Drywall Application Materials was the fifth question of the survey related to research question one. This section pertains to the uses of drywall materials, trims, fasteners, and adhesives. Learning how to properly handle and store drywall and how to use these materials on the jobsite will also be addressed.

Respondents were asked to rate a set of statements according to how each of these factors, pertaining to Drywall Application Materials, supports construction industry standards. In summary,

- 88% Agree and Strongly Agree that the Drywall section of the chapter support industry standards
- 79.4% Agree and Strongly Agree that Fasteners section was up to industry standard
- 76.65% Agree and Strongly Agree that Finish Trim was relevant to industry standards
- 70% Agree and Strongly Agree that Drywall Delivery, and Handling and Storage was up to industry standards

The mean rating for Drywall Application Materials showed a strong agreement that ranged from 3.89 to 4.35 with an overall mean of 4.11. The four components of Drywall Application Materials had a high median rating of 4.00 with an overall median rating of 4.00. Drywall had the highest Mean of 4.35 and the lowest Standard Deviation of .72.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Drywall Application Materials section had a high level of agreement supporting construction industry standards. Table 9 presents the responses the responses related to Drywall and Application Materials content in the Interior Systems Manual.

Table 9

Drywall Application Materials

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Drywall	(0%)	1(1.1%)	10(10.9%)	37(40.2%)	44(47.8%)	4.35	4.00	.72
Finish Trim	(0%)	8(8.8%)	17(18.7%)	32(35.2%)	34(37.45%)	4.01	4.00	.96
Fasteners	1(1.1%)	3(3.3%)	15(16.3%)	31(33.7%)	42(45.7%)	4.20	4.00	.91
Drywall Delivery, Handling, Storage	6(6.7%)	5(5.6%)	16(17.8%)	29(32.2%)	34(37.8%)	3.89	4.00	1.12
Overall	7(1.9%)	17(4.7%)	58(15.9%)	129(35.3%)	154(42.2%)	4.11	4.00	.81

Measuring and Cutting Drywall was the sixth question of the survey related to research question one. This part covers the tools and methods used to prepare drywall panels for installation. Safe and skillful tool use and techniques for measuring and cutting drywall accurately are essential for successful performance on the job.

Respondents were asked to rate a set of statements according to how each of these factors, according to Measuring and Cutting Drywall, support construction industry standards. In summary,

- 83.5% Agree and Strongly Agree that the Drywall Cutting Tools section support industry standards
- 79.4% Agree and Strongly Agree that Taking Cutouts Measurements section was up to industry standard
- 77.1% Agree and Strongly Agree that Cutting Shapes was relevant to industry standard
- 73.6% Agree and Strongly Agree that Cutting Full Sheets was relevant to industry standards

The mean rating for Measuring and Cutting Drywall showed a strong agreement that ranged from 4.12 to 4.24 with an overall mean of 4.19. Three components of Measuring and Cutting Drywall had a high median rating of 5.00 with an overall median rating of 4.50. Taking Cutout Measurements had the highest Mean of 4.23 and the lowest Standard Deviation of .97.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Measuring and Cutting Drywall section had a high level of agreement supporting construction industry standards. Table 10 presents the responses related to Measuring and Cutting Drywall content in the Interior Systems Manual.

Table 10

Measuring and Cutting Drywall

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Drywall Cutting Tools	3(3.3%)	4(4.4%)	8(8.8%)	29(31.9%)	47(51.6%)	4.24	5.00	1.02
Cutting Full Sheets	2(2.2%)	3(3.3%)	19(20.9%)	21(23.1%)	46(50.5%)	4.16	5.00	1.0.
Taking Cutouts Measurements	2(2.2%)	4(4.3%)	13(14.1%)	25(27.2%)	48(52.2%)	4.23	5.00	.97
Cutting Shapes	3(3.3%)	5(5.4%)	13(14.1%)	28(30.4%)	43(46.7%)	4.12	4.00	1.06
Overall	10(2.4%)	16(3.8%)	53(12.6%)	156(37.2%)	184(44%)	4.19	4.50	.92

Soffits was the seventh question of the survey related to research question one. This section goes over several different types of soffits and their uses, giving layout and installation procedures. Also, the procedures for creating soffit templates to increase productivity were discussed in the section.

Respondents were asked to rate a set of statements how each of these factors according to Soffits influenced their decision. In summary,

- 90.35% Agree and Strongly Agree that the Braced Soffits section of the chapter support industry standards
- 88% Agree and Strongly Agree that What is a Soffits section was up to industry standard
- 83.7% Agree and Strongly Agree that Unbraced Soffit and also Beam Soffit was relevant up to industry standards
- 81.4% Agree and Strongly Agree that Draft Soffit and Curtain Walls and also Curved Soffits was relevant to industry standards
- 80.3% Agree and Strongly Agree that Print Reading for Soffits was relevant to industry standards
- 78.3% Agree and Strongly Agree that Light Pocket Soffit was up to industry standards
- 78.1% Agree and Strongly Agree that Eyebrow Soffit was sufficient to industry standards
- 68.2% Agree and Strongly Agree that Prefabricated Soffit Components was satisfactory to industry standards

The mean rating for Soffits showed a strong agreement that ranged from 4.00 to 4.33 with an overall mean of 4.18. All the components of Soffits had a high median rating of 4.00 with an overall median rating of 4.10. What is a Soffit had the highest Mean of 4.33 with the lowest Standard Deviation of .79.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Soffits section had a high level of agreement supporting construction industry standards. Table 11 presents the responses relatated to Soffits content in the Interior Systems Manual.

Table 11

Soffits

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
What is a Soffit	1(1.1%)	1(1.1%)	9(9.8%)	37(40.2%)	44(47.8%)	4.33	4.00	.79
Printreading for Soffits	3(3.3%)	1(1.1%)	14(15.4%)	34(37.4%)	39(42.9%)	4.15	4.00	.95
Unbraced Soffit	1(1.1%)	3(3.3%)	11(12.0%)	40(43.5%)	37(40.2%)	4.18	4.00	.85
Braced Soffit	1(1.1%)	1(1.1%)	7(7.65%)	42(45.7%)	41(44.6%)	4.32	4.00	.76
Beam Soffit	1(1.1%)	2(2.2%)	12(13.0%)	37(40.2%)	40(43.5%)	4.23	4.00	.84
Eyebrow Soffit	1(1.1%)	1(1.1%)	18(19.8%)	39(42.9%)	32(35.2)	4.10	4.00	.83
Light Pocket Soffit	1(1.1%)	(0%)	19(20.7%)	40(43.5%)	32(34.8%)	4.11	4.00	.81
Draft Soffit and Curtain Walls	1(1.1%)	(0%)	16(17.6%)	39(42.9%)	35(38.5%)	4.18	4.00	.80
Prefabricated Soffit Components	2(2.2%)	3(3.3%)	24(26.4%)	26(28.6%)	36(39.6%)	4.00	4.00	1.00
Curved Soffits	2(2.2%)	1(1.1%)	14(15.4%)	33(36.3%)	41(45.1%)	4.21	4.00	.90
Overall	14(1.5%)	13(1.4%)	144(15.8%)	367(40.1%)	377(41.2%)	4.18	4.10	.73

Job Planning was the eighth question of the survey related to research question one. This section introduces the job planning aspect of acoustical ceiling installation. The four most important factors of job planning are print reading, handling and storage, acoustical tool and personal protective equipment (PPE), and layout.

Respondents were asked to rate a set of statements, pertaining to Acoustical Job Planning, as it supports construction industry standards. In summary,

- 87% Agree and Strongly Agree that the Layout section of the chapter support industry standards

- 79.4% Acoustical Tool (PPE) Agree that section was up to industry standard
- 67.1% Agree and Strongly Agree that Handling and Storage was relevant to industry standards
- 55.2% Agree and Strongly Agree that Print Reading was relevant to industry standards

The mean rating for Job Planning showed a strong agreement that ranged from 3.90 to 4.36 with an overall mean of 4.15. Two components of Job Planning had a high median rating of 5.00 with an overall median rating of 4.25. Layout had the highest Mean of 4.36 and the lowest Standard Deviation of .85.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Job Planning section had a high level of agreement supporting construction industry standards. Table 12 presents the responses related to Job Planning (acoustical ceiling installation) content in the Interior Systems Manual.

Table 12

Job Planning

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Print Reading	4(4.4%)	3(3.3%)	11(12.1%)	25(27.5%)	48(52.7%)	4.21	5.00	1.07
Handling and Storage	5(5.5%)	3(93.3%)	22(24.2%)	27(29.7%)	34(37.4%)	3.90	4.00	1.12
Acoustical Tool (PPE)	2(2.2%)	3(3.3%)	14(15.2%)	31(33.7%)	42(45.7%)	4.17	4.00	.96
Layout	2(2.2%)	(0%)	10(10.9%)	31(33.7%)	49(53.3%)	4.36	5.00	.85
Overall	13(36%)	9(2.5%)	57(15.6%)	114(31%)	173(47.3%)	4.15	4.25	.84

Ceiling Components was the ninth question of the survey related to research question one. This section describes the various components, such as wall molding, tile, hangers, carriers,

furring and cross tees of a typical acoustical ceiling system. Understanding the materials, correct applications, and proper installation requirements will create a more productive and skilled installer of acoustical ceiling system.

Respondents were asked to rate each statement, pertaining to Ceiling Components, as it supports construction industry standards. In summary,

- 88.1% Agree and Strongly Agree that Layout section of the chapter support industry standards
- 84.6% Furring and Cross Tees Molding section was up to industry standard
- 81.6% Agree and Strongly Agree that Molding & Hanger was Relevant up to industry standards
- 71.7% Agree and Strongly Agree that Clips and Miscellaneous Components was Relevant up to industry standards

The mean rating for Ceiling Components showed a strong agreement that ranged from 4.04 to 4.35 with an overall mean of 4.2. One part Tile had a high median rating of 5.00 with an overall median rating of 4.21. Tile had the highest Mean of 4.35 with the lowest Standard Deviation of .82.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Ceiling Components had a high level of agreement supporting construction industry standards. Table 13 presents the responses related to Ceiling Components content in the Interior Systems Manual.

Table 13

Ceiling Components

	Strongly Disagree	Disagree	Item	Agree	Strongly Agree	Mean	Median	Std. Dev.
Molding	2(2.2%)	2(2.2%)	13(14.1%)	33(35.9%)	42(45.7%)	4.21	4.00	.92
Hangers	2(2.2%)	2(2.2%)	13(14.1%)	33(35.9%)	42(45.7%)	4.21	4.00	.92
Carries	2(2.2%)	2(2.2%)	13(14.3%)	35(38.5%)	39(42.9%)	4.18	4.00	.91
Furring and Cross Tees	1(1.1%)	2(2.2%)	11(12.0%)	32(34.8%)	46(50.0%)	4.30	4.50	.82
Clips and Miscellaneous Components	1(1.1%)	3(3.3%)	22(23.9%)	31(33.7%)	35(38.0%)	4.04	4.00	.93
Tile	1(1.1%)	2(2.2%)	8(8.7%)	34(37.0%)	47(51.1%)	4.35	5.00	.82
Overall	9(1.1%)	13(1.6%)	80(10%)	449(56%)	251(31.3%)	4.21	4.25	.81

Codes and Standards was the tenth question in the survey related to research question one. This section focuses on the more common code requirements used in an installation of a ceiling system. Installers familiar with IBC codes, ASTM standards, and CISCA recommendations and practices, along with local, state, and federal codes will install acoustical ceilings correctly.

Respondents were asked to rate each statement, pertaining to Codes and Standards, as it supports construction industry standards. In summary,

- 63.7% Agree and Strongly Agree that International Building Codes (IBC) section of the chapter support industry standards
- 60.7% Agree and Strongly Agree that American Society for Testing Materials (ASTM) section was up to industry standard
- 60.2% Agree and Strongly Agree that Ceiling & Interior System Construction Association (CISA) was relevant up to industry standards.

The mean rating for Codes and Standards showed agreement that ranged from 3.78 to 3.93 with an overall mean of 3.82. All three components had a high median rating of 4.00 with an overall median rating of 4.00. International Building Codes (IBC) had the highest Mean of 3.93 with a Standard Deviation of 1.00.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Codes and Standards section had an agreement supporting construction industry standards. Table 14 presents the responses related to Codes and Standards content in the Interior Systems Manual.

Table 14

Codes and Standards

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
International Building Codes	1(1.1%)	5(5.6%)	27(30.0%)	23(25.6%)	34(37.8%)	3.93	4.00	1.00
American Society for Testing Materials	3(3.4%)	4(4.5%)	28(31.5%)	29(32.6%)	25(28.1%)	3.78	4.00	1.02
Ceiling & Interior System Construction Association	3(3.4%)	5(5.7%)	27(30.7%)	26(29.5%)	27(30.7%)	3.78	4.00	1.06
Overall	7(2.6%)	14(5.2%)	82(30.7%)	78(29.2%)	86(32.3%)	3.82	4.00	.99

Exposed Ceiling was the eleventh question of the survey related to research question one. Understanding the procedures used to install an exposed grid ceiling is the foundation for understanding of all other grid ceilings. The main concerns for the ceiling installer are that the ceiling be put in square and level, and that all the components are straight. The more this process is practiced, the more productive and efficient the installation.

Respondents were asked to rate each statement, pertaining to Exposed Systems, as it supports construction industry standards. In summary,

- 77% Agree and Strongly Agree that 15/16” Standard T-Shape section of the chapter support industry standards
- 74.8% Agree and Strongly Agree that 9/16” Standard T-Shape section was up to industry standard
- 69.9% Agree and Strongly Agree that Slotted 9/16” Grid was relevant to industry standards
- 63.8% Agree and Strongly Agree that 11/2” Exposed Gasket Grid was relevant to industry standards

The mean rating for Exposed Systems showed a strong agreement that ranged from 3.79 to 4.01 with an overall mean of 3.91. All four components had a high median rating of 4.00 with an overall median rating of 4.000. 15/16” Standard T-Shape had a highest Mean of 4.01 with a Standard Deviation of 1.05.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Exposed Systems section had a level of agreement supporting construction industry standards. Table 15 presents the responses related to the Exposed Systems content in the Interior Systems Manual.

Table 15

Exposed Systems

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
15/16" Standard T-Shape	4(4.4%)	4(4.4%)	13(14.3%)	36(39.6%)	34(37.4%)	4.01	4.00	1.05
9/16" Standard T-Shape	4(4.4%)	4(4.4%)	15(16.5%)	39(42.9%)	29(31.9%)	3.93	4.00	1.03
Slotted 9/16" Grid	4(4.3%)	3(3.3%)	21(22.8%)	33(35.9%)	31(33.7%)	3.91	4.00	1.04
1½" Exposed Gasket Grid	4(4.4%)	6(6.6%)	23(25.3%)	30(33.0%)	28(30.8%)	3.79	4.00	1.09
Overall	16(4.4%)	17(4.7%)	72(19.7%)	138(37.8%)	122(33.4%)	3.91	4.00	1.01

Research Question 2: Special Features of the Instructional Manual. Research question two asked members of the Mid-Central Illinois Regional Council of Carpenters-JATC what special features of the Interior Systems manual they found useful in their effort in meeting specific objectives and learning outcomes. In summary,

- 75% Agree and Strongly Agree that the procedures are in logical order and had a Mean value of 4.02 with a Standard Deviation of .86
- 89.3% Agree and Strongly Agree that the procedures matched objectives & learning outcomes and had a Mean of 4.03 and a Standard Deviation of .82
- 68.5% Agree and Strongly Agree that self check questions adequately covered the content of the section and had a Mean of 3.99 and a Standard Deviation of .90
- 80.4% Agree and Strongly Agree that safety tips are relevant to the industry and had a Mean of 4.20 and a Standard Deviation of .80
- 60.8% Agree and Strongly Agree that productivity tips are realistic to job site conditions and had a Mean of 3.74 and a Standard Deviation of 1.10

- 65.2% Agree and Strongly Agree that trade tips are relevant to job site conditions and had a Mean of 3.82 and a Standard Deviation of .97
- 78.3% Agree and Strongly Agree that key terms were defined and emphasized in the chapter content and had a Mean of 4.04 and a Standard Deviation of .98
- 78.23% Agree and Strongly Agree that quality of the drawings were adequate in the manual and had a Mean of 3.99 and a Standard Deviation of .94
- 83.7% Agree and Strongly Agree that the quality of the photographs were adequate in the manual and had a Mean of 4.07 and a Standard Deviation of .90
- 76.1% Agree and Strongly Agree that the worksheets were relevant to the understanding of the chapters and had a Mean of 3.95 and a Standard Deviation of .87
- 79.4% Agree and Strongly Agree that the chapter review questions were comprehensive to the chapters and had a Mean of 4.08 and a Standard Deviation of .88

The mean rating for Special Features showed a strong agreement that ranged from 3.74 to 4.20. All components had a high median rating of 4.00 with an overall median rating of 4.00. Emphasis on Safety Tips Relevant to the Industry had a highest Mean of 4.20 and the lowest Standard Deviation of .80.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Special Features in the Interior Systems Instructional Manual had a high level of agreement and the members find useful in their efforts in meeting specific objectives and learning outcomes. Table 16 and Figure 1 present the responses related to the Special Features content in the Interior Systems Manual.

Table 16

Special Features in Instructional Manual

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Procedures in logical order	(0%)	5(5.4%)	18(19.6%)	39(42.4%)	30(32.6%)	4.02	4.00	.86
Procedures matched objectives & learning outcomes	(0%)	5(5.4%)	14(15.2%)	46(50.0%)	27(39.3%)	4.03	4.00	.82
Self check questions covered the content of the section	(0%)	4(4.3%)	25(27.2%)	31(33.7%)	32(34.8%)	3.99	4.00	.90
Safety tips relevant to the industry	(0%)	2(2.2%)	16(17.4%)	36(39.1%)	38(41.3%)	4.20	4.00	.80
Productivity tips realistic to job conditions	4(4.3%)	7(7.6%)	25(27.2%)	29(31.5%)	27(29.3%)	3.74	4.00	1.10
Trade tips relevant to job site conditions	1(1.1%)	8(8.7%)	23(25.0%)	35(38.0%)	25(27.2%)	3.82	4.00	.97
Key terms defined and emphasize in chapter of content	2(2.2%)	6(6.5%)	12(13.0%)	38(41.3%)	34(37.0%)	4.04	4.00	.98
Quality of drawings adequate	3(3.3%)	3(3.3%)	14(15.2%)	44(47.83%)	28(30.4%)	3.99	4.00	.94
Quality of Photographs adequate	3(3.3%)	2(2.2%)	10(10.9%)	48(52.2%)	29(31.5%)	4.07	4.00	.90
Worksheets relevant to the understanding of the chapters	1(1.1%)	5(5.4%)	16(17.4%)	46(50.0%)	24(26.1%)	3.95	4.00	.87
Chapter review questions comprehensive to the chapters	1(1.1%)	4(4.3%)	14(15.2%)	41(44.6%)	32(34.8%)	4.08	4.00	.88
Overall	15(1.5%)	51(5.1%)	187(18.6%)	433(43.2%)	317(31.6%)	4.00	4.00	.72

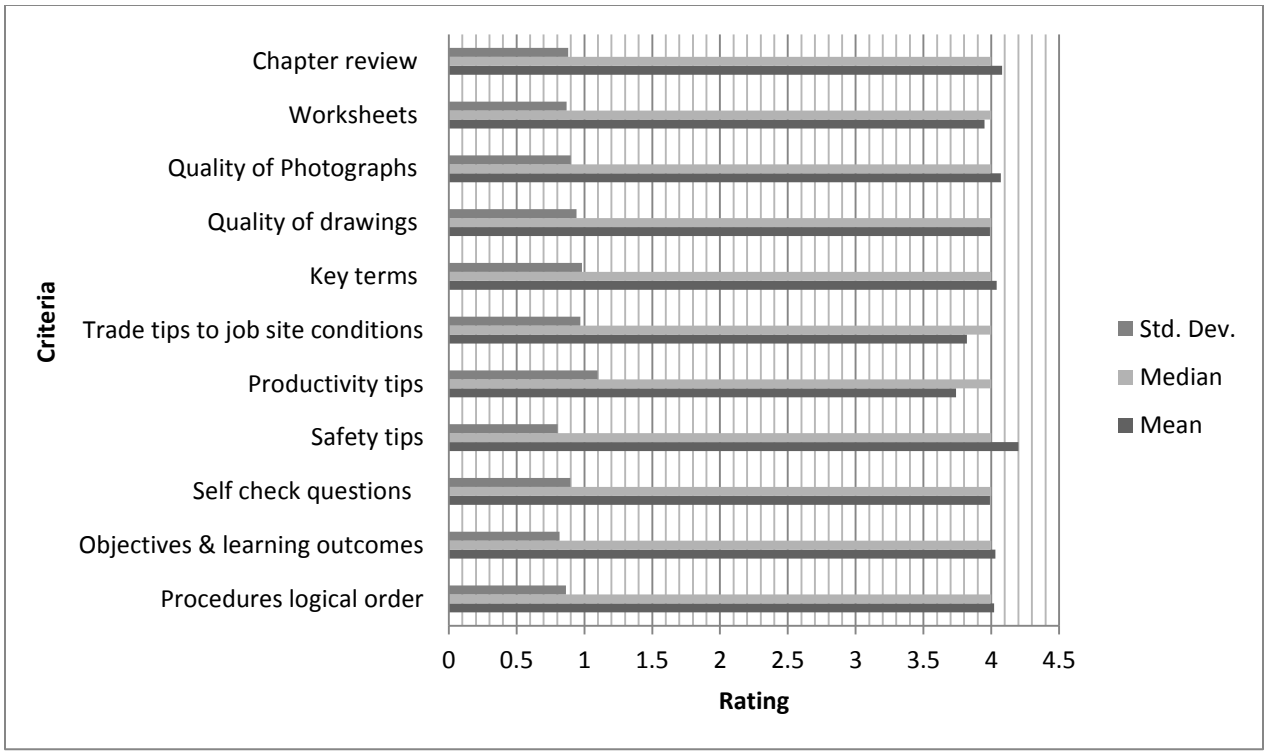

Figure 1. Special features

The final review of the Manual was the second question of the survey related to research question two. Respondents were asked to rate a set of statements according to how each of these features of the Interior Systems Instructional Manual they found useful in their efforts in meeting specific objectives and learning outcomes. In summary,

- 75% Agree and Strongly Agree that the Training Material was up to Industry Standards and had a Mean value of 3.98 with a Standard Deviation of .95
- 66.3% Agree and Strongly Agree that the Duties and Tasks Correlated to the Job Site Conditions and had a Mean value of 3.76 with a Standard Deviation of .98
- 69.6% Agree and Strongly Agree that the Photographs Were Consistent With the Construction Industry and had a Mean of 3.85 and a Standard Deviation of .94

- 79.4% Agree and Strongly Agree that Safety Tips Were Consistent With on the Job Training and had a Mean of 4.10 and Standard Deviation of .87

The mean rating for the Final Review of the Interior Systems Instructional Manual showed a strong agreement that ranged from 3.76 to 4.10. All the components had a high median rating of 4.00 with an overall median rating of 4.0. Safety Tips Consistent With on the Job Training had the highest Mean of 4.10 and the lowest Standard Deviation of .87.

Therefore, considering the mean values relative to the standard deviation value respondents agree or strongly agree that the Final Review of the Interior System Instructional Manual had a high level of agreement and the members find useful in their efforts in meeting specific objectives and learning outcomes. Table 17 and Figure 2 presents the responses related to the Final Review content in the Interior Systems Manual.

Table 17

Final Review of Manual

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Median	Std. Dev.
Training up to Industrial Standards	1(1.1%)	7(7.6%)	15(16.3%)	39(42.4%)	30(32.6%)	3.98	4.00	.95
Duties & Tasks correlated to job site conditions	2(2.2%)	8(8.7%)	21(22.8%)	40(43.5%)	21(22.8%)	3.76	4.00	.98
Photographs consistent with construction industry	2(2.2%0	5(5.4%)	21(22.8%)	41(44.6%)	23(25.0%)	3.85	4.00	.94
Safety tips consistent with on the job training	1(1.1%)	3(3.3%)	15(16.3%)	40(43.5%)	33(35.9%)	4.10	4.00	.87
Overall	6(1.6%)	23(6.3%)	72(19.6%)	160(43.5%)	107(29%)	4.00	4.00	.72

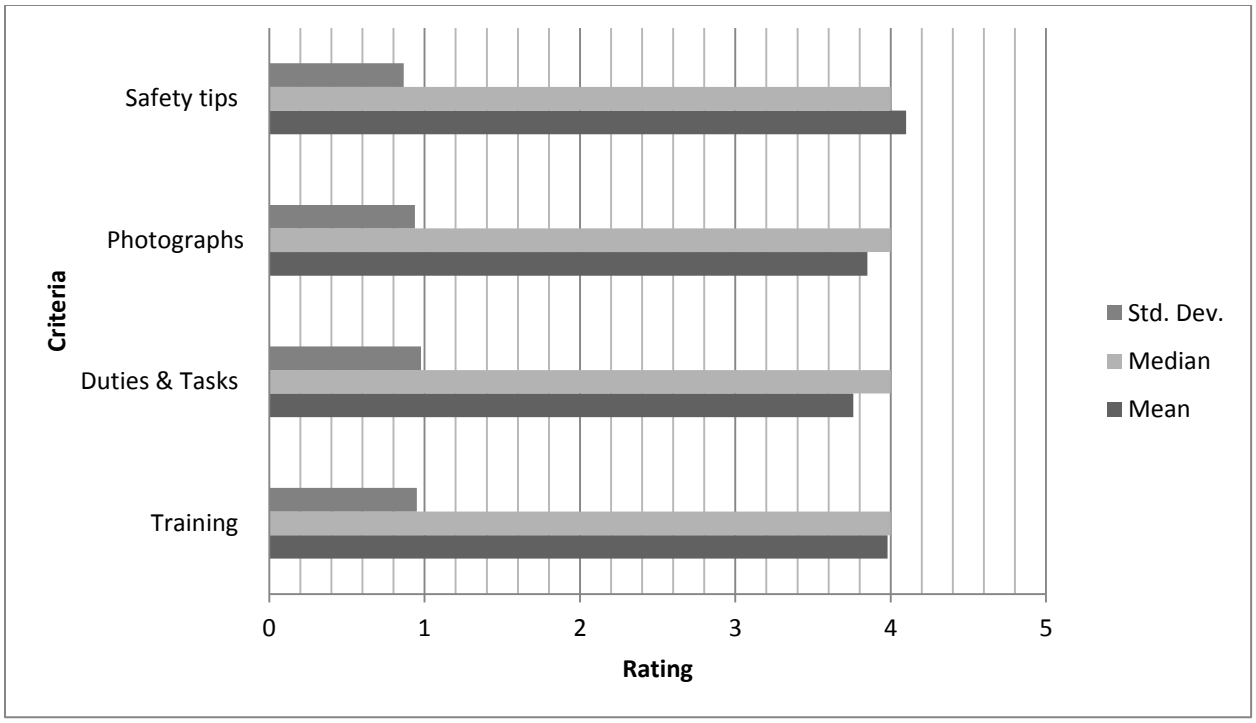

Figure 2. Final review of manual

Summary

The data from the graduated apprentices on their perceptions of satisfaction with the instructional value of the Interior System manual was presented in Chapter Four. Descriptive and statistical findings identified apprentices' perceptions of the instructional value and the usefulness of the special features in the manual in meeting objectives and learning outcomes to the respondents' data. Conclusions and recommendations relating to the data are addressed in Chapter Five.

Chapter V: Discussion

This study was conducted to gather information and identify the graduate apprentice's perceived value of the Interior System instructional manual at the Mid-Central Illinois Regional Council of Carpenters – JATC for utilization in the course of study. Data was gathered from 92 graduate apprentices of the MCIRCC-JATC. The results of the study provided the Trustees of the JATC with information that would allow them to focus on long term improvements and make changes in the Interior Systems instruction.

This chapter presents the summary, conclusions, and recommendations of the study.

Summary

The purpose of this study was to determine the perception of instructional materials used in the training of carpentry apprentice graduates from the Mid-Central Illinois Regional Council of Carpenters – JATC. Specifically the study sought to identify the perception of the journeyperson on the instructional value of the Interior System manual used at the Mid-Central Illinois Regional Council of Carpenters – JATC used in the apprentice program course of study.

The population selected for this study was limited to graduated apprentices of the four-year registered apprenticeship program of the Mid-Central Illinois Regional Council of Carpenters – JATC. A list of the graduated apprentices, with a total available population of 189 carpentry apprentice graduates, was obtained from the data-base of the MCIRCC-JATC. The graduated carpentry apprentices who turned journeyperson used the manual for related instruction while attending classes at the JATC. The journeyperson who graduated from the years 2009, 2010, 2011 and 2012 were selected for this study.

A 73-item survey using a 5-point Likert scale was administered. The survey consisted of statements pertaining to the usefulness of the Interior System manual used to train apprentices and members of the Mid-Central Illinois Regional Council of Carpenters – JATC.

The survey also included questions that provided demographic data concentrating on year of graduation, age group, and percent of time apprentices have worked performing Interior Systems and the type of contractors they were presently working.

After receiving approval with an exempt status from the IRB for Ethical Research on Human Subject on October 17, 2012 from the University of Wisconsin-Stout, a survey was administered to the 189 graduated apprentices who turned journeyperson in the years 2009, 2010, 2011 and 2012.

A cover letter introducing the researcher with an explanation of the study was followed by an invitation to all graduate carpentry apprentices to participate in the study. The graduates from the two largest locals were mailed an invitation to participate in the study using their home local training site that included specific meeting dates and times. Due to an initial low response rate to participate in this manner the researcher mailed the survey to all the remaining union participants of the two largest locals and to the rest of the participants of the study. The survey was mailed on November 12, 2012 to the 171 participants at their last known address listed in the data base of the MCIRCC-JATC. The researcher requested the survey be returned in three weeks of the mailing, with a date of December 7, 2012 requested. The number of respondents who completed and returned the survey instrument consisted of a total of 92 yielding a response rate of 48%.

Limitations

The survey used in this study could potentially yield bias which limits generalization of the results. As discussed earlier, this study sought to identify the graduate apprentice's perceived value of the Interior System Instructional manual at the Mid-Central Illinois Regional Council of Carpenters – JATC. Therefore, results are specific to the training center in central Illinois and may not be generalized by other UBC training centers outside the territorial area of the Mid-Central Illinois Regional Council of Carpenters - JATC.

The study focused on the Interior System Manual used by the Mid-Central Illinois Regional Council of Carpenters - JATC. The survey instrument was designed by the researcher; therefore the survey results are limited to the opinions and answers revealed by the respondents, the graduated carpentry apprentices of 2009-2012.

Data Results

The demographic profile of participants in this study yielded meaningful data in that the respondents provided a heterogeneous representation of graduate apprentices.

The demographic data collected included year of graduation, age group, and percent of time apprentices had worked performing Interior Systems and what type of contractors they were presently working.

Graduation: Of the 92 graduates who completed the survey, 35 respondents graduated in 2012; 29 respondents graduated in 2011; 15 respondents graduated in 2010; 13 respondents graduated in 2009.

Age Group: Of the 92 respondents, who completed the survey, 7 respondents (7.6%) represented 20-25 age grouping, 38 respondents (41.3%) represented 26-31 age grouping, 33

respondents (35.9%) represented 32-37 age grouping, 7 respondents (7.6%) represented 38-43 age grouping and 7 respondents (7.6%) represented 44-49 age grouping.

The percent of time apprentices had worked performing Interior Systems: Of the 92 respondents 13 worked 100% performing Interior Systems, 21worked (75%) performing Interior Systems, 21 worked (50%) performing Interior Systems, 16 worked (25%) performing Interior Systems and 21 worked under (25%) performing Interior Systems.

Type of contractors employing graduates are presently working for: Of the 92 respondents 45 (48.9%) worked for a General Contractor, 11 (12.0%) worked for a Carpentry Contractor, 20 (21.7%) worked for an Interior System Contractor and 16 (17.4%) worked for a Specialty Contractor.

Research question 1: How does the technical information described in the chapters of the Interior System manual support construction industry standards? In questions 1-54 of the survey, respondents were asked to evaluate the content of the 11chapters of the manual that addressed research question one. Respondents rated each statement on how it supports industry standards within the duties and tasks of an Interior System carpenter. The graduated apprentices were very satisfied with the technical information supporting construction industry standards in the Interior System manual. They felt it was a reliable document for instructional purposes.

Overall, the findings from questions 1-54 showed a mean of 4.15 and a standard deviation of .67. This suggests the graduated apprentices were highly satisfied and there was a high level of consensus with the technical information of the chapters of the Interior Systems manual in supporting construction industry standards.

In addressing research question one; the Shaft Wall and Area Separation Wall chapter graduated apprentices were highly favorable with the content of the chapter that showed an overall mean of 4.23. The four components of Shaft Walls and Area Separation Walls had a median rating of 4.00. This chapter had the highest level of consensus with a standard deviation of .64.

The Exposed Ceiling System chapter, showed a favorable level of agreement with an overall mean of 3.91. All four components had a high median rating of 4.0 with an overall median rating of 4.0. The standard deviation of 1.01 showed a broader distribution of responses with lower level of consensus with this item.

Research Question 2: What specific features of the Interior Systems Manual do the apprentices and members of the Mid Central Illinois Regional Council of Carpenters – JATC find useful in their effort in addressing meeting specific objectives and learning outcomes? Overall, the findings of the study related to specific features, questions 55-65, were found to be very positive showing a mean of 3.99 and a standard deviation of .72. This suggests the graduated apprentices were in agreement with the content of the special features of the Interior Systems manual in addressing the attainment of specific objectives and learning outcomes.

Question 58 asked if the emphasis on safety tips were relevant to the industry. Eighty-four percent of the respondents agreed or strongly agreed they were relevant to the industry. Results were found to be very positive with a mean rating of 4.20 and the highest level of consensus with a standard deviation of .80. This was not surprising based on the researchers experience because safety is the most important aspect of working on the job. Training in safety in their related instruction is always the number one priority taught to the apprentices.

Question 59 asked the respondents if productivity tips were realistic to job conditions. Sixty-one percent agreed or strongly agreed to the question. The mean of 3.74 and a standard deviation of 1.10 showed the results were more inconsistent with a broad distribution of responses and with a lower consensus relating to realistic job site conditions.

The final review of the manual in questions 66-69 respondents were asked to rate the Interior System manual. The mean showed a strong agreement that ranged from 3.76 to 4.10. All the components had a high median rating of 4.00. The standard deviation ranged from .87 to .95.

Question 66 asked, After final review of the manual, were the training materials up to industry standards? Seventy-five percent agreed and strongly agreed that the training material was up to industry standards. This statement had a mean value of 3.98 with a standard deviation of .95.

Question 67 asked, After final review of the manual, were the duties and tasks correlated to job site conditions? Sixty-six percent agreed and strongly agreed that the duties and tasks correlated to the job site conditions. This had a mean value of 3.76 and a standard deviation of .98. The graduate apprentices agreed that the duties and tasks covered in the manual helped implement their knowledge to perform different aspects on the job.

Question 68 asked, After final review of the manual, were the photographs consistent with the construction industry? Seventy percent agreed and strongly agreed that the photographs were consistent with the construction industry and had a mean of 3.85 and a standard deviation of .94. There is little doubt that humans have extraordinary capabilities for remembering visual information according to (Bruning, Norby, & Schraw, 2011).

Question 69 asked, After final review of the manual, were the safety tips consistent with on the job training? Ninety Percent of the respondents agreed and strongly agreed that

safety tips were consistent with on the job training. This had a mean of 4.10 and a standard deviation of .87.

Conclusion

The United Brotherhood of Carpenters and Jointers of America is the leader in the construction industry through quality training programs providing the skills, knowledge and abilities necessary to maintain performance superiority (Then and Now, 2009). Apprenticeship is a clear cut path for career development and is essential to provide highly skilled productive apprentices which produce competent journey workers. There was a need to upgrade the curriculum to match industry standards. The UBC began developing a new curriculum in the form of instructional manuals.

Through the process of build the book, the Mid-Central Illinois Regional Council of Carpenters – JATC developed an Interior System manual and implemented this into the course of study for the apprentices. An analysis of the Interior System manual indicated this document is valid and reliable to use in the course of study at the Mid-Central Illinois Regional Council of Carpenters – JATC.

The results of this study included a high degree of agreement by the respondents when it comes to the special features of the manual and correlation with the literature review. The respondents stated that the effective manual has the following characteristics: they are well written, they are attractively designed, and they are formatted to make it easy for users to follow (Casady, 1992). Beyond their apprenticeship, the Interior System manual will be a valuable resource for the journeyperson to refer to, and to reinforce their knowledge in the work that they will perform.

The results also revealed the respondents were highly satisfied with the technical information described in the chapters of the Interior System manual supporting construction industry standards. As addressed in the literature review the curriculum content included in the manual is based on the industry standards and developed in close consultation with the industry (Lamos, Simon, & Waits, 2010).

Recommendations

Based on the responses of the graduated apprentices of the Mid-Central Illinois Regional Council of Carpenters-JATC and the overall findings of the study the following recommendations are presented:

- Continuous improvement should be made to the Interior System Instructional Manual to ensure the technical content presented in the manual is current and up to industry standards.
- Explore enhanced special features, productivity and trade tips, in the Interior System manual need to be more applicable to the Interior System craftsman.
- Replicate this study with journeymen who have worked at the trade for at least five years beyond their apprenticeship in Interior Systems to validate the findings of this study.
- Consider revision with input from labor and management for the future improvements in the Exposed Ceiling Systems chapter with a standard deviation > 1.0.

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Appendix A: Letter Institutional Review Board

Title: An Analysis of an Interior System Training Manual for Utilization in the Mid–Central Illinois Regional Council of Carpenters Joint Apprentice Training Program.

Description: The purpose of this study is to evaluate the technical information and special features of the Interior System Manual. The information will provide for continuous improvements to train apprentices and journeymen of the MCIRCC – JATC.

Participants are graduate carpentry apprentices from the MCIRCC-JATC who graduated in 2009, 2010, 2011 and 2012.

Risks and Benefits: There is no risk for the participants in this study. The benefits are the participants can provide insightful information on how the Interior System Manual is meeting the training needs by to the apprentices and members of the Mid-Central Illinois Regional Council of Carpenters.

Time Commitment: This Survey will take approximately 30 minutes.

Confidentiality: Your name will not be included on any documents. You cannot be identified from any of this information.

Right to Withdraw: Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequence to you. You have the right to stop the survey at any time. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document after it has been turned into the investigator.

IRB Approval: This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

Statement of Consent: By completing the following survey you agree to participate in the project entitled, An Analysis of an Interior System Training Manual for Utilization in the Mid–Central Illinois Regional Council of Carpenters Joint Apprentice Training Program.

Investigator:	**Research Advisor**	**IRB**
Robert Swegle	**Dr. Carol Mooney**	**Sue Fox Research Services**
MCIRCC-JATC	**UW-Stout**	**UW-Stout**
904 Brenkman Dr.	**232 Communication Technologies**	**152 Voc Rehab Bldg**
Pekin, IL 61554	**Menominee, WI 54751**	**Menomonie, WI 54751**
rswegle@mcircc-jatc.com	**mooneyc@uwstout.edu**	**foxwells@uwstout.edu**
309-353-4232	**715-232-1444**	**715-232-2477**

Appendix B: Letter to Respondents

Date

Name
Address
City, Zip Code

Dear ,

My name is Robert W. Swegle, Training Director of the Mid-Central Illinois Regional Council of Carpenters – JATC. I am currently completing my Educational Specialist Degree in Career and Technical Education through the University of Wisconsin-Stout. As part of my degree, I am conducting a study which is titled, An Analysis of an Interior System Training Manual for Utilization in the Mid–Central Illinois Regional Council of Carpenters Joint Apprentice Training Program.

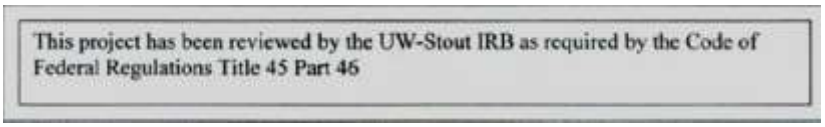
As part of your related instruction as an apprentice, you used the different Interior System manuals as part of your apprenticeship training. The purpose of this study is to secure your professional opinion and to evaluate the content on it's instructional value in the course of study. With this information, the Trustees of the JATC will be able to focus on long term improvements at the JATC.

I would appreciate your assistance in completing the survey and I am depending on your opinion and judgment in evaluating the manual. The survey will take no more than 30 minutes to complete. All information will remain confidential. Please complete and return the survey in the enclosed self-addressed stamped envelope by November 30, 2012. If you have any questions please don't hesitate to contact me at rswegle@mcircc-jatc.com or call the JATC at 309-353-4232. Thank you for your time and assistance for taking part in this study.

Fraternally,

Robert W. Swegle
Training Director
MCIRCC-JATC

Appendix C: Survey



Interior System Instructional Manuals

The purpose of this study is to assess the usefulness of the Interior System instructional manual used to train apprentices and members of the Mid Central Illinois Regional Council of Carpenters - JATC. The results will help the instructors and leadership in continuous improvements efforts. Your knowledge and expertise is critical to this research. Your cooperation and participation is greatly appreciated. By completing this survey you are acknowledge that you are voluntary participating in the study. All respondent answers will be kept anonymous.

Directions: The Interior System Instructional manual is a very important part of apprenticeship training. Please read the following question very carefully and answer each individual sub-heading using the scale provided below.

1	2	3	4	5	N/A
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Non/Applicable**

Are the following sub-headings in the content of the Interior System Manual relevant to performing the duties and tasks of an Interior System Carpenter?

Materials

1. Stud and Track	1	2	3	4	5	N/A
2. Ceiling and Wall Furring	1	2	3	4	5	N/A
3. Additional Furring Components	1	2	3	4	5	N/A
4. Finish Beads	1	2	3	4	5	N/A
5. Fasteners	1	2	3	4	5	N/A
6. Handling and Storage of Metal Framing Material	1	2	3	4	5	N/A

Job Planning

7. Reading Prints	1	2	3	4	5	N/A
8. Site Inspection	1	2	3	4	5	N/A
9. Estimating	1	2	3	4	5	N/A
10. Layout	1	2	3	4	5	N/A

Shaft Wall and Area Separation Walls

11. Fire and Sound Ratings	1	2	3	4	5	N/A
12. Materials	1	2	3	4	5	N/A
13. Shaft Walls	1	2	3	4	5	N/A
14. Area Separation Walls	1	2	3	4	5	N/A

Metal Framing

15. Layout Procedure for a Metal Stud Partition	1	2	3	4	5	N/A
16. Layout Doors and Windows	1	2	3	4	5	N/A
17. Metal Stud Cutting	1	2	3	4	5	N/A
18. Track Installation	1	2	3	4	5	N/A
19. Stud Layout and Installation	1	2	3	4	5	N/A

Drywall Application Materials

20. Drywall	1	2	3	4	5	N/A
21. Finish Trims	1	2	3	4	5	N/A
22. Fasteners	1	2	3	4	5	N/A
23. Drywall Delivery, Handling, and Storage	1	2	3	4	5	N/A

Measuring and Cutting Drywall

24. Drywall Cutting Tools	1	2	3	4	5	N/A
25. Cutting Full Sheets	1	2	3	4	5	N/A
26. Taking Cutouts Measurements	1	2	3	4	5	N/A
27. Cutting Shapes	1	2	3	4	5	N/A

Soffits

28. What is a Soffit	1	2	3	4	5	N/A
29. Printreading for Soffits	1	2	3	4	5	N/A
30. Unbraced Soffit	1	2	3	4	5	N/A
31. Braced Soffit	1	2	3	4	5	N/A
32. Beam Soffit	1	2	3	4	5	N/A
33. Eyebrow Soffit	1	2	3	4	5	N/A
34. Light Pocket Soffit	1	2	3	4	5	N/A
35. Draft Soffit and Curtain Walls	1	2	3	4	5	N/A
36. Prefabricated Soffit Components	1	2	3	4	5	N/A
37. Curved Soffits	1	2	3	4	5	N/A

Job Planning

38. Print Reading	1	2	3	4	5	N/A
39. Handling and Storage	1	2	3	4	5	N/A
40. Acoustical Tool and Personal Protective Equipment (PPE)	1	2	3	4	5	N/A
41. Layout	1	2	3	4	5	N/A

Ceiling Components

42. Molding	1	2	3	4	5	N/A
43. Hangers	1	2	3	4	5	N/A
44. Carries	1	2	3	4	5	N/A
45. Furring and Cross Tees	1	2	3	4	5	N/A
46. Clips and Miscellaneous Components	1	2	3	4	5	N/A
47. Tile	1	2	3	4	5	N/A

Codes and Standards

48. International Building Codes (IBC)	1	2	3	4	5	N/A
49. American Society for Testing Materials (ASTM)	1	2	3	4	5	N/A
50. Ceiling & Interior System Construction Association (CISA)	1	2	3	4	5	N/A

Exposed Systems

51. 15/16" Standard T-Shape	1	2	3	4	5	N/A
52. 9/16" Standard T-Shape	1	2	3	4	5	N/A
53. Slotted 9/16" Grid	1	2	3	4	5	N/A
54. 1 ½" Exposed Gasket Grid	1	2	3	4	5	N/A

Directions: The special features in the training manuals are a vital part of the instructional manuals. Please read the following statements very carefully and answer the questions using the scale provided.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	Agree	Strongly Agree

`

As you utilized the special features in the instructional manuals did you find the…

55. procedures in a logical order?	1	2	3	4	5
56. procedures matched the objectives and learning outcomes?	1	2	3	4	5
57. self check questions adequately covered the content of the section?	1	2	3	4	5
58. emphasis on safety tips relevant to the industry?	1	2	3	4	5
59. productivity tips realistic to job conditions?	1	2	3	4	5
60. trade tip are relevant to job site conditions?	1	2	3	4	5
61. key terms were defined and emphasized in the chapter content?	1	2	3	4	5
62. quality of drawings adequate?	1	2	3	4	5
63. quality of photographs adequate?	1	2	3	4	5
64. worksheets relevant to the understanding of the chapters?	1	2	3	4	5
65. chapter review questions comprehensive to the chapters?	1	2	3	4	5

Directions: Training at the local JATC and on the job is a good way to implement the knowledge covered in the instructional manuals. Please read the following statements very carefully and answer the questions with the scale provided.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	Agree	Strongly Agree

After finial review of the manuals were the…

66. training materials up to industry standards?	1	2	3	4	5
67. duties and tasks correlated to job site conditions?	1	2	3	4	5
68. photographs consistent with the construction industry?	1	2	3	4	5
69. safety tips consistent with on the job training?	1	2	3	4	5

Directions: Lastly, I need to know a few things about you as a respondent to my study. Please read the following questions and fill in the circle next to the most appropriate answer.

70. What year did you graduate from the MCIRCC-JATC?

2012 ○
2011 ○
2010 ○
2009 ○

71. What is your age group?

20-25 ○
26-31 ○
32-37 ○
38-43 ○
44-49 ○

72. What is the percent of time you have worked performing Interior Systems?

100% ○
75% ○
50% ○
25% ○
Under 25% ○

73. What type of contractor are you presently working for?

General Contractor ○
Carpentry Contractor ○
Interior System Contractor ○
Specialty Contractor ○

Thank you for taking the time out of your busy schedule to complete this survey.