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Improving Outcomes for Non-Affiliate Based Fire Academy Students

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**IMPROVING OUTCOMES FOR NON-AFFILIATE BASED FIRE ACADEMY
STUDENTS**

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Improving Outcomes for Non-affiliate Based Fire Academy Students.

INTRODUCTION

Central Problem

The focus of this research is concerned with a community college based Joint Powers agency, (JPA), created to provide basic and in-service training to the public safety community in the San Francisco Bay area. The Joint Powers Agency is comprised of seven community colleges and operates independently of those colleges while deriving operational funding through Full Time Equivalent Student hours, (FTES). A The South Bay Regional Public Safety Training Consortium, (SBRPSTC), through a Fire Training Coordinator presents a weekend format firefighter basic academy. The Coordinator is responsible for all fire training presented by the organization. Curriculum presented is the standard for the industry in Northern California and the "Academy" is certified by the California Department of Forestry/State Fire Marshall's Office, State Fire Training.

Student populations in current weekend based fire academies consist predominantly of non-affiliated, (not currently employed as a firefighter) and volunteer fire fighters who are sponsored by a fire agency.

The majority of the students are regularly employed in civilian industry, attend other schools or have significant weeklong commitments.

This is in stark contrast to full time employed firefighters attending a Regional Joint Firefighting Academy that meets Monday through Friday for the duration of the training. These students are called recruits and have been hired after a substantial testing and interview process that resulted in their names being placed on an eligibility list for hiring.

A comparative study has shown there is a significant difference in average student outcomes (block quiz scores) between the non-affiliate academy students and the full time firefighter students in the professional academy.

The goal of this research paper is to determine if the current weekend format contributes to lower level of exam scores and if so what simple but significant changes could be made to the structure or format of the program. Proposed changes would be guided towards improving student performance. Changes could range from controlling testing for entry-level students to making no changes at all.

Research Questions

The following questions represent possible viable alternatives and will assist in identifying the issues more clearly:

1. How much would entry-level pretests, as a tool for selecting student populations, result in an increase in student outcomes, (scores)?
2. How much impact does the weekend format have on retention of information and student outcomes, (scores)?
3. Are student outcomes, (scores), adequate given the application and presentation of the program?

Methodology

This research looks at a specific type of learning as a concept in education. Adult learning concepts differ from traditional university based education. Adult learning as developed and recognized by Knowles states:

"Attempts to account for the unique characteristics of adult learners have led to the development of a theory of adult learning-'andragogy,' the art and science of helping adults learn, vs. 'pedagogy,' the art and science of teaching children," (Mensah, 2000, p8).

Research will look at adult learning concepts from the viewpoint of fire service instructional components as standardized statewide and nationwide.

The research begins with a comparative study to define the issue, qualitative background in the form of instructional texts, reference books, journal articles and a blind study.

The weekend format fire academy is unique in community college and vocational education arenas. Given a lowered measurable difference in the averages of randomly selected quiz scores, there is concern that the format may be at the heart of these reduced scores in the Regional Fire Academy. The variables involved in this research involve first of all the student populations. The student populations from the Regional Joint Fire Academy sponsored by the Santa Clara County Fire Training Officers and the Regional Fire Academy, (weekend format), sponsored by SBRPSTC were utilized to provide needed comparisons. Statistical information was gathered, randomly selected and compared to arrive at the stated levels. Variables such as curriculum, question database and format were not considered for this study. Variables such as instructors, instructional periods and training sites were not considered or involved with the study.

The results of the comparative study were not unexpected. Students applying and enrolling in this program do not compete in terms of prescriptive testing, physical agility or prior college/school transcripts. Any prospective student who can pass a doctor's physical exam and pay the tuition can enroll. The hypothesis states: **Student Scores for the Regional Fire Academy are lower than professional firefighter student counterparts.**

An opinion survey, the results of the survey and the comparison study are available in the appendix of this paper.

REVIEW OF LITERATURE

The literature review will include three areas: (a) professional texts, curriculum for the course, and policies & procedures from the certifying agency, (b) reference books addressing adult learning, retention and learning types through case studies, experiments and research, and (c) professional journals providing further support to the research.

This chapter is divided into three main sections, which are directly related to the research questions. Literature from each of the reference areas will be reviewed in the appropriate research question divisions.

How much would entry-level pretests, as a tool for selection, result in an increase in student outcomes?

The instructor's text used for reference here is the industry standard instructors training manual for the fire service in California and mirrors the national standards for fire service instructors. One of very few research materials that make specific reference to the subject of pretests, especially as a tool for selection, but does not specifically speak to the use as a tool for improving student outcomes or scores. What the text does provide is a set of parameters under which pretests are generally used.

The text uses the term Prescriptive Testing under the subheading of tests as being "Classified According To Purpose," (IFSTA, 1990, p200). The fire service instructor's manual tells readers that Prescriptive Testing is usually administered at the beginning of instruction for the purpose of measuring overall readiness or to determine a student's placement. Tests measuring readiness are used to determine if the student has the skills to perform in the administered training. Tests determining placement are asking whether or not the student has already achieved the behavioral objectives:

"If so, the student should move on to the next course or unit of instruction. If not, the student can attend the class,"
(IFSTA, 1990, p201).

This standard for the industry, instructors training manual is designed for vocational education to be administered to adults of all age groups. The areas referenced directly address the issue of pre-testing as a tool for selection and student outcomes. The text material tells the reader that these prescriptive tests are used to measure readiness or determine placement and do not make a point of influencing final scores. This material does address pre-testing and selection.

Suitability for training or 'trainability tests' has been used in the arena of industrial training for several years. Although controversial, they are a method by which a company can determine if an employee has the mental or physical capabilities to absorb and complete a training regime to be prescribed by the company. Howe discusses a general training paradigm at length with regards to industrial training. This discussion centers on a six-step process to industrial training with evaluation being the final step in the process. One of the discussion points is directed at 'Selection for Training'. The author observes that there are many situations where a specific selection test is not required due to the qualifications, limitations, or the size of the applicant pool. He does go on to make observations about the various types of selection tests and the situations under which they may be appropriate. One of his passages relates:

"The array of procedures used to select trainees is vast and ranges from the humble five-minute interview to careful psychometric testing or the use of special tests to measure trainability *per se*," (Howe, 1977, p192).

Although Howe is dealing with a much broader picture, he is making reference to the practice of pre-testing for the purpose of selection. These pre-tests are measuring readiness and determining placement just as those described in the Fire instructor's manual did. The tests are not an effort to manipulate final scores, but to determine entry-level qualifications.

A study compared quiz scores of students in two different regional fire academies. One group represents the students in this research project and the other a group of recruit firefighters hired by municipal fire departments and attending a five-day a week academy. This group is the control group. The study is a simple comparison of randomly selected students and their scores on randomly selected topics. Cumulative score averages were then compared against one another. Though not directly attributable to the issue of increasing student outcomes, what is of interest is that the students in the recruit classes were all products of a recruiting process that required written, physical, and mental pretests to determine placement and qualification on an eligibility list. The most highly placed applicants, were, in most cases hired by the agencies after a substantial testing process.

Though the study does not directly address the question of pretests as a tool for increasing outcomes, it clearly is associated with the concept of entry level pre-testing as a tool for placement and selection.

How Much Impact Does the Weekend Format Have on Retention of Information and Student Outcomes, (scores)?

Howe conducted experiments in adult learning to determine how people acquire knowledge.

His experiments in adult learning dealt with word recall in adults averaging around thirty years of age. Though these experiments are related to the weekend format issue of this paper, they also address retention of information by adults in the learning process. Where Howe does seem to touch on the issue at hand is his statement:

"A broader apparent implication of these findings for research into adult learning is that we ought to pay rather more attention to learners' activities...and attend less exclusively to instructional variables and matters of presentation-the manner in which materials are made available," (Howe, 1977, p149).

What Howe is saying is that format of instruction and the instructional presentation are less important than the way in which adults learn, the different things they do to learn, and the strategies they adopt individually to learn are far more important. The following pages are of specific interest in learning in that they reflect on another experiment in which Howe looks at the aspect of note-taking as an adjunct to learning and retention. While the action of taking notes in an of itself is not significant by itself, the:

"significance of notes to the learner may lie in the combined outcome of both note-taking and note-using activities," (Howe, 1977, p151).

What the author does continue to say is that note-taking helps students' learning by causing him/her to pay attention to the material being presented, it can cause the learner to obtain a clearer version of the material presented, and the learner is performing additional mental processing to produce the notes which makes the material more relevant.

Howe, in his writings is telling the reader that the concept of format and presentation to the adult learner are less important than the way in which the adult processes information. Retention of information and outcomes are more a factor of the learner's activities and motivations. The idea of note taking as an impact on retention is an issue for the Summary and Conclusions to address for further research.

One of the references utilized in this research spends a significant amount of print time in the discussions and definition of adult learning. Realizing the importance of these concepts, Mensah features discussions and definitions of Andragogy. Quoting from Knowles, p54, the author says of adult learners:

"Attempts to account for the unique characteristics of adult learners have led to the development of a theory of adult learning-'andragogy,' the art and science of helping adults learn, vs. 'pedagogy' the art and science of teaching children" (Mensah, 2000, p).

Reflecting further on Knowles, Mensah says that the adult learner does best in informal settings they are comfortable with, are highly motivated and have a serious need to know. The author ties these theories together with the "Laws of Learning" by Thorndike. These are the same as found in the IFSTA Fire Instructors manual. The author continues by relating that adult learners sometimes have difficulty returning to education due to complicated schedules, family obligations, and other new constraints of education. The motivated adult learner however is generally able to overcome these obstacles and move forward in spite of the difficulties.

The author in this case presents a variety of discourses to adult learning and the needs of the adult learner. Information retention is considered in these discussions, but with little reflection on alternative formats and the issues of increasing student outcomes. The message seems to be recognition of the concepts and definitions of adult learning and the impact on retention through those ideas. Little information directly relating to the impact of format and student outcomes is included. However, as with other authors, the value of motivation is addressed and will be also later in this paper.

An article by Kennedy discusses retention directly along with the context of Adult Learning as well as a somewhat distant reference to the format of instruction. Accordingly, the ability of adults to retain knowledge declines with age.

Adults achieve maximum function about the age of twenty and slowly declines into the seventies. Learning needs to be used in order to be retained and those bits of knowledge not used regularly will be lost. Training programs need to format their classes to "provide frequent practice as soon as possible after the instruction" (Kennedy, 2003, p4).

The article by Kennedy reveals some insight into vocational education and adult learning. He recognizes the differences in Adult Learners and also realizes the instructor can, through differing formats, presentations and motivations provide interest and incentive to an aging society who is willing to learn. His article is one of the few that have touched on the issue of conditions of presentation. It is interesting this comes from a vocational education background.

The comparison study, (Pollard, 2002) is useful in giving the reader some insight into the motivation of students with regards to format and retention. The significance of the difference in overall randomly selected quiz score averages should key the reader to the fact that the student populations hold the key to many of the answers. As will be discussed in the Findings section, one can see that the students who hold down newly achieved job status that is contingent on completing successfully the academy, has a significantly higher motivation factor than does the student who wishes to become a firefighter.

The majority of reference material for this question seems to focus on the issue of adult learning concepts and how they impact the retention of information. Format is mentioned only sporadically and seems to be more of a concern where vocational education is concerned. Other ideas and thoughts for future research have come out of this paper and will be addressed in the Summary and Conclusions section.

Accelerated learning for adults has attracted much attention in the last few years and the growth of these programs at the university level has prompted community colleges to try these new concepts. A journal article by Swenson addresses the concept of accelerated learning for adults. While the main context of the article is a reflection on what is occurring at one of the major extended campus universities, there is some information regarding format and learning. The author makes the point that accelerated programs are attended primarily by students who have other commitments, such as full time work, families etc. These personal commitments do not preclude people from becoming students in programs having a unique format. It is believed that the learner through their own designs will achieve that which is necessary to meet their needs. He states:

"A learner's preferred learning style, dominant perceptual mode, role, motivation, interest in the subject matter, and other variables combine to make every individual learning transaction a universe of one. The obvious lesson is that teaching formats and structures do not guarantee results," (Swenson, 2003, p1).

The issue with this author is the contention that the format, the teaching styles, and the methods of instruction are irrelevant. Adult learning occurs when and if the learner is prepared and ready to accept the information. The person who is interested in learning and motivated will achieve the results regardless of the format.

Are Student Outcomes, (scores), Adequate Given the Application and Presentation of the Program?

The instructor text for the fire service again gives the readers a few clues regarding adult learning and reasons for learning. The authors touch on the subject of Student Motivation as a factor in learning and begin with:

"A student must have a desire or need to learn before there can be comprehension. This desire or need is called **motivation**," (IFSTA, 1990, p59).

Motivation will be addressed in the Summary and Conclusions part of this paper.

METHODOLOGY

Overview

The research questions focus on the effectiveness of a community college based firefighter-training program that is presented in a unique format. Due to the weekend format of this program and the nature of the student population in attendance, questions have surfaced regarding the level of achievement of the students.

Initial research consisted of a comparative study of student populations in two opposing styles of training program. The results of that study provided a baseline by which the student scores from the weekend format academy could be compared and a determination made as to the need for further research. Once it was determined there was a significant difference in student averages a hypothesis and set of research questions were developed and the second phase of the project was undertaken.

A survey was conducted of the most recent student population of the Regional Fire Academy to determine what, if any, issues the student themselves had with the level of instructor/student contact, the frequency of class meetings, and suggestions for revision of the meeting schedule.

The third phase of research involved review of reference material relevant to the three research questions posed in the introduction of this paper. This material consisted of relevant instructor texts, student curriculum, reference books, and journal articles obtained through the university library web based information services.

Limitations

For the purposes of this paper, the three-part research design described above was limited to one type of research sample in two variables. Students in the Santa Clara County Joint Fire Academies over a three year period were considered to be the control group, (dependent variable), for this study. These students were hired by public fire agencies after an extensive recruiting and testing process. They were paid as firefighters to attend a Firefighter one Academy at one of the sponsoring agencies training sites in Santa Clara County, California. Successful completion of the academy by the students was rewarded by full time employment with the sponsoring agency as a firefighter. Scores for these students were tracked over a three-year period.

The independent variable or study group represented a three-year grouping of students completing the Regional Firefighter One Academy for non-affiliates. The tracking of students and scores represented the same time period as the control group.

The study group was comprised primarily of students who are/were attempting to attain employment as a firefighter, but, have/have not yet achieved a high placement in the recruiting/testing process or have not taken any tests. Other factors involved include the course curriculum, difference in presentation (format), instructional staff, and location of class.

The curriculum presented to both groups is the same and the student texts are the same. Questions for quizzes come from the same database. Both academies are certified by the same State agency for presentation of the material. Class presentation takes place geographically similar to that of the Joint Fire Academies. Several class locations are provided to the students. One is in San Jose, one in South Santa Clara County, one in San Benito County and one in Monterey County. All training sites are approved by the State Fire Agency. Instructional staff are highly experienced Fire Professionals with many years of experience both in the service and in instruction. Many of the staff are State Fire Training, Master Instructors.

The survey was limited to students in the non-affiliate academy for the last 12-month period. Students completed an end of course evaluation within which additional questions have been inserted to survey opinions regarding the format and frequency of the academy. Questions took the form of opinions with regards to presentation and format.

Research was conducted to gather expert opinion, case studies and other forms of research in the realm of Adult Learning Concepts. **It is important to note that participant identification in all cases was omitted. The student populations in the comparative study were assigned numbers only. Respondents to the survey did not provide any identification as instructed by the course coordinator. The findings of the research are limited to the samples used, and should not be generalized to a larger group.**

Characteristics and Collection

The research samples collected for the comparison study consists of quiz scores and students. Each block of instruction in an academy relates to a topic or area of interest. These range from Fire Behavior to Fire Chemistry. A sample for any of those blocks would consist of quiz scores for all of the selected students who have taken that quiz.

A specific number of students are selected from the total student population to take part in this study. Student names are deleted from the records and each student in each group is assigned a number.

The total number of quizzes remains constant in both the control group and test group. Twenty-five quiz topics were converted to numerical value in sequence from one to twenty-five. It was discovered that more students, (148), attended the non-affiliate academy during the research period than did the Joint Fire Academies, (91).

The top 91 students from the non-affiliate academies were assigned numbers from 1-91 in sequential order, as were the 91 students in the Joint Fire Academies.

A random number generator, www.random.org, was utilized to select ten quiz topic numbers as shown in the appendix. The random number generator was then used to select ten student numbers. The same numbers were used for both student groups. Having the selection process in place the next step was to match the overall quiz scores for each student for the selected topics. These scores were then averaged for each student in each group.

The survey was undertaken primarily due to the wide range of ages in the student population of the Regional academy. The ages of the mixed gender group range from seventeen years to over forty years of age. It was determined there was a need to ask the students how they were impacted by the weekend format. However, the students were only concerned with completing the end of course evaluation. Subsequently, three discrete questions were added to an end of course evaluation as part of the course evaluation. Each student completes a course evaluation and instructor evaluations for all staff at the end of the course of instruction.

Names and identification are not included on the evaluation sheets, which are forwarded directly to the program coordinator for review. The embedded questions and values are collated to produce raw data.

The final section of this research is confined to scholarly references, web based journals, and vocational texts. This entire project is centered on Adult learning concepts and retention of information given a unique instructional format. These reference materials lend credibility to certain assumptions and devalue other assumptions. Case studies, former research, field experts, and current journals form a basis for opinions to certain research questions. The firefighters curriculum text and the fire instructor's text form the basis for certain relevancies that support much of the reference material.

Summary

The research process began with an independent study to compare student outcomes (scores) in a community college based firefighter non-affiliate training academy with those of an agency sponsored firefighter academy. Both academies utilized the same curriculum and database for quizzes. Scores were tabulated and compared. The results led to the undertaking of this paper.

The purpose of this paper is to explore through research questions, ways to improve student performance in terms of outcomes. Three questions guide this process.

A simple survey consisting of three independent questions was applied to the student population as part of an overall end of course evaluation. This was done for the purpose of gauging student opinion regarding the present training format. The final research component consists of a collection of technical texts, reference books and web based journal articles that address adult learning concepts.

FINDINGS

Summary of Methodology

Research began as a comparative study between two groups of students. These students were related in that they were enrolled in the same curriculum, however, one group was hired by municipal fire agencies and the other group consisted of aspiring firefighters not yet tested or hired by an agency. The comparison of quiz scores was for a parallel period of three years worth of academies. All personal information was deleted prior to the onset of the study. The results indicate a significant difference in the overall score averages with the regional academy coming in lower than that of their counterparts. This prompted the research questions regarding pre-testing, presentation format, and acceptability of current status quo. A survey of SBRPSTC students and additional scholarly research of texts, references and journals is used to test the research questions.

How much would entry-level pretests, as a tool for selecting student populations, result in an increase in student outcomes?

- Entry-level pretests (prescriptive tests) are not generally designed to facilitate increases in final scores. These tests are given prior to instruction:

"They measure readiness or determine placement. *When measuring readiness*, the tests should answer the question 'Does the student have the skills needed to perform in the course?' If not, remedial activities should be offered or the student should accumulate more job experience. *When determining placement*, the test should answer the question, 'Has the student already achieved the behavioral objectives?' If so, the student should move on to the next course," (IFSTA Instructor, 1990, p200)

- Prescriptive tests measuring readiness are frequently used to identify requisite skills for entry. These types of tests are most likely found in public service entry level testing as an initial step in a recruiting process.
- Data has not tended to substantiate or validate the research question. Pre-tests are generally used to determine placement or readiness prior to a course of study.

How much impact does the weekend format have on retention of information and student outcomes?

- Instructional design for firefighter academies in California is generally a combination of Competency based learning and Adult Learning Concepts- also known as Andragogy:

"Andragogy is derived from the Greek words meaning 'adult' (actually, 'man') (andros) and 'leading' (agogos). It rests upon different assumptions and uses different techniques than 'pedagogy' (derived from the Greek words meaning 'boy' and 'leading'). Malcolm S. Knowles, perhaps the best-known advocate of this method of teaching adults, defines Andragogy as '... the art and science of helping adults learn, in contrast to pedagogy... the art and science of teaching children,'" (Mensah, 2000, p105).

- Studies in adult learning concepts have addressed retention of information by adult learners. Howe undertook a study on retention by adult learners:

"what an individual retains is very strongly determined by what he himself has previously done. It is the materials which he himself has already produced or reproduced that will be remembered in the future," (Howe, 77, p148).

- Howe continues his investigation of retention and indicates that instructors should pay close attention to the activities of learners:

“the things they do in the course of learning and the strategies they adopt-and less exclusively to instructional variable and matters of presentation-the manner in which materials are made available,”
(Howe, 77, p151).

Howe presents further studies and experiments that address the issues of retention. These findings continue to validate the concept of learner’s activities in the learning environment and do not address the concepts of format.

- Thorndikes’s Learning Laws provide some insight into the learning process. The Law of Readiness suggests that students need to be motivated to learn and retain:

“The Law of Readiness means a person can learn when physically and mentally adjusted to receive stimuli. This readiness to learn is evident in a class where students show high interest and anticipation of the activities to be carried out during a lesson,”
(IFSTA Instructor, 1990,p60).

The Law of Recency addresses the concepts of application and evaluation or retention:

"Reviews, warm-ups, and make-up exercises are all based on the principle that the more recent the exercise, the more effective the performance.

The principle of recency simply means that practicing a skill just before using it will ensure a more effective performance," (IFSTA Instructor, 1990,p67).

- Kennedy, in his journal article, discusses Adult Learning and retention at length. His article reviews principles of Adult Learning and specifically addresses the issue of retention as it relates to age and time. Kennedy informs the reader- that learning ability in adults tends to decline with age and peaks around the age of 20 declining gradually into the 70's. He further relates:

"In short, learning must be used. Individuals tend to forget those items of knowledge and those skills that they do not use regularly. Therefore, training programs should provide a variety of opportunities to use what is gained. They should test, repeat, and provide officers with an opportunity to practice what they learned at previous sessions. For maximum benefit, programs should include practice opportunities as soon as possible after the instruction," (Kennedy, 2003, p4).

- A survey of the student population reinforces the idea that class sessions need to be more frequent in terms of reducing the span between sessions. Participants answered questions related to the adequacy of instructor/student contact time, the frequency of class sessions and how that frequency should be modified. While respondents did not answer every question in every case, the results are as follows.

Survey respondents overwhelmingly felt that they had adequate instructor/student contact. This represented 87% of the student population and is a function of availability to inquiries and issues both during and away from class. Instructors, coordinators, and staff make themselves available for any inquiries by the students by providing home phone, cell phone and page numbers. Survey question two addressed whether or not class should be held more frequently. A slight majority, 55%, indicated they thought class sessions should be scheduled during weeknights to supplement the weekend schedule. The final survey question asked how often more classes should be scheduled. Choices were monthly, bimonthly, and weekly. Again, not all the participants responded to this question. Of those that did, 3.2% indicated one added class per month, 6.5% preferred bimonthly additions and 45% indicated a desire to have a weekly weeknight class between sessions.

- The information provided above would seem to validate or support the research question in that more frequent scheduling of classes appears to be needed.

Are student scores (outcomes), adequate given the application and presentation of the program?

- With regards to the standards set by the State Fire Marshall's Office, State Fire Training, the student score averages are within acceptable ranges. The comparison study indicated an average achievement of 76.12% as shown through random sampling. Although these numbers are significantly lower than the control group in the study, they meet both the requirements of the State agency and the transcribing community college.

Summary

Entry level or prescriptive tests are tools for determining readiness or placement. They do not, in and of themselves, provide a basis for gauging outcomes.

Studies of adult learners by certain academics have indicated that retention is tied to learner's activities as opposed to format.

The State Fire Agency approved instructor's guides and texts tend to affirm through the laws of learning that retention can be tied to personal motivation and the recency of review/practice of information.

A journal article from a professional law enforcement magazine addresses age as a factor in retention and also shows that training programs need to provide tests, repetition, and opportunities to practice and learn. These should be provided as soon as possible after the initial training.

A survey of program participants addressed student instructor/contact, the need for increased frequency of classes, and how frequent additions should be.

Finally, student scores are low, but, adequate given the current presentation and application of the program.

SUMMARY

And

Areas for Further Research

Summary

This research paper addresses the issue of student outcomes or scores with relation to a community college based vocational training program. Three research questions have been posed and the findings are summarized below.

How much would entry-level pretests, as a tool for selecting student populations result in an increase in student outcomes?

Vocational instructional material has shown that pretests, also called 'prescriptive tests' are not utilized or designed to specifically increase student scores. These types of tests are designed to measure readiness to accept instruction or determine placement. Public agencies use prescriptive tests primarily for recruiting and hiring personnel and can involve a battery of different combinations of tests to place a person on an eligibility list. Prescriptive tests in education are used to place prospective students.

The research and data do not substantiate the research question. Increases in student outcomes would not occur directly as a result of pre-testing.

How much impact does the weekend format have on retention of information and student outcomes?

Student learning and retention are based on the types of learning concepts that are utilized in the State Fire Training system. A combination of Competency Based Learning and Adult Learning theories, (Andragogy), are the basis for instruction. The research tends to show that while format could have some impact on learning and retention, the primary influence on learning and retention in adults has to do more with the learner's motivation and attitude. Adult learners receive and retain information best when they have the incentive and are mentally prepared.

A survey of students in the Academy that addressed this topic indicated a high percentage of students felt they had ample instructor/student contact while the numbers for those who thought more frequent class meetings was less than compelling with only 55% in favor of more frequent classes.

Though the information appears to show that format could have an impact on retention, the question seems to come back again to student motivation and learning. Student outcomes are not directly attributable to the format at this time.

Are student outcomes, (scores), adequate given the application and presentation of the program?

The standards set by the State Fire Training agency identifies minimal acceptable scores to maintain current status in all training courses. Student averages for the history of the program have achieved or exceeded the standards of acceptance. This question does not and will not require additional study.

Areas for further research

The research for the questions addressed in this paper has brought about some interesting issues and additional areas for future research. Prescriptive testing as generally used by public agencies does not have an impact on scores, or does it? Agencies use these tests to weed out those who they deem are not qualified or capable of completing the training. Two or more issues come out of this process and the association with the control group in the comparison study.

Students in the Joint Fire Academies (JFA), have significantly higher scores than do their counterparts at the Regional Fire Academy with a weekend format. The students in the JFA have undergone a barrage of competitive entry-level tests.

These tests include written, physical agility, oral, and mental tests as well as extensive background investigations of those who are being considered in the final phases. Once a job offer has been made to the prospective employee and accepted, the new employee is sent directly to a basic training academy. Students are monitored from this point on by the department training officer and are encouraged to perform at optimal levels of achievement.

There is a significant level of motivation on the part of not only the student but also the agency to encourage higher levels of performance. The agency has a significant investment in the employee and does not want to see them fail or perform in mediocrity. The student has before them a bright future, for many years, with a new employer. The motivation on the part of the student is significantly higher than it might otherwise be due to the constant threat of the loss of their employment. New municipal employees are hired on a probationary status. As with all Civil Service type jobs, an employee in a safety position can be terminated during the training and probation cycle for any reason. A lack of performance and achievement can be one of those reasons.

Students in the Regional Academy have a different level of motivation in most cases and are not dependent on this training for present wage earnings. They are not under the pressure of employment or job.

Motivation has to come for different reasons and the student can put less effort into the educational process and still complete the training successfully.

Retention and the adult learner became a main focus in this report. One of the more interesting aspects of the research that came to light was the concept of note taking and retention of information. Howe presented some interesting experiments in the area of note taking and retention. This concept is used at other community college based fire academies in the state. Some more militaristic in nature require a finely organized and hand printed notebook to be presented for a grade at the end of instruction. This is done ideally to require the students to pay better attention to the material being presented and to ultimately payoff of in terms of better grades or scores.

The most significant issues associated with future research and the Regional Fire Academies will deal with prescriptive testing to provide a more highly screened applicant pool prior to admission. This will be done to bring the application process more closely in line with the hiring processes of the agencies. Additionally, the concept of a required notebook to be kept by the student for grades and study will be looked at for implementation and study. These two issues could become primary research for a three to five year study.

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APPENDIX

Opinion Survey

(Participation is Voluntary and your personal privacy will be maintained)

3 QUESTIONS: PLEASE CIRCLE THE ANSWER THAT MOST CLOSELY MATCHES YOUR PERSONAL OPINION.

1.

The Academy provided adequate instructor/student contact time.

Adequate Not Adequate

2.

Would it have been better if the Academy were taught on a schedule that included weeknights as well as weekends?

Yes No

3.

If Yes on the prior question, how often should a weeknight class be included?

Once a Month Every other week once weekly

OPINION SURVEY RESULTS

91 Respondents

1.

The academy provided adequate instructor/student contact time?

Adequate 81 answers 87%

Not Adequate 12 answers 13%

2.

Would it have been better if the academy were taught on a schedule that included weeknights as well as weekends?

Yes 51 answers 55%

No 39 answers 42%

3.

If Yes to prior question, how often should a weeknight class be included?

Once a Month 3 answers 3.2%

Every other Week 6 answers 6.5%

Once a Month 42 answers 45 % (of total respondents)

A COMPARISON OF BLOCK QUIZ SCORES

A COMPARISON OF BLOCK QUIZ SCORES FOR
FIRE FIGHTER ONE ACADEMIES-
PROFESSIONAL VERSUS VOCATIONAL

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ABSTRACT

My office is responsible for a Regional Fire Academy presented in a weekend format that is conducted bi-annually. Attendees of this academy are typically aspiring fire fighters not affiliated with a department, with periodic attendance by paid personnel from smaller departments and Paid Call Firefighters. The local county fire training officers association also conducts a fire academy bi-annually for paid members of fire departments. These academies are based on a standard 40-hour workweek. Both academies utilize the same training material and references as approved by the state fire training agency. Data is collected from available records maintained by the course coordinators of the regional non-affiliate fire academy and from the Joint Fire Academy course coordinators.

This paper will look at comparisons of randomly selected students and student block quiz scores for past academies. The results of these comparisons will yield a broad indication of the overall effectiveness of the weekend format academy. The conclusion of the paper will indicate a lower average for block quiz scores for the weekend format academy.

A COMPARISON OF BLOCK QUIZ SCORES FOR THE FIRE FIGHTER ONE ACADEMIES

Introduction

A regional, non-affiliate fire fighter academy is presented twice yearly in Hollister, California by the South Bay Regional Public Safety Training Consortium. More specifically, a full time fire technology coordinator is responsible for this program. A nation wide and state wide recognized curriculum is used to provide instruction. The instructor pool is made up of current and retired fire fighters having expertise in various subjects. The Hollister Fire Department provides equipment, staffing, and apparatus. The Consortium provides facilities and instructional staff are paid by the Consortium. Students attending this program are generally aspiring fire fighters with a sprinkling of paid firefighters from small local departments.

This organization also sponsors bi-annual fire fighter academies as presented in Santa Clara County, California, by the local fire training officers association. The curriculum for these academies is identical as that for the non-affiliate academies. Similarly, the instructor pool for the paid fire fighters academy is comprised mostly of working fire fighting professionals with subject matter expertise. Students are newly hired fire fighters from the local departments, brought together in a Joint Fire Academy concept. Participating departments contribute equipment, apparatus, facilities, and staffing in support of these academies.

The purpose of this paper will be to compare quiz scores for the non-affiliate and joint fire academies. This will be accomplished by collecting data for the past three years that provides identifiable topic quiz scores and student numbers. A random number generator will provide ten random student numbers and ten random subjects from the curriculum.

The data will be presented to identify and compare the average quiz scores for those selected students. The focus will be upon the difference in average scores between the two groups.

Finally, an analysis of the data and results of comparison will indicate that a significant disparity exists in the level of scores between the two groups of students. A comprehensive analysis in the form of another research project will determine, (at a later date and time), where the problem lies and recommend a corrective action.

Literature Review

Literature review for this research is simple and consists of a relatively short list of material. The nature of this research is predicated on existing data that was available to me upon request. The need to review literature is based upon the desire to ensure the test subjects have been exposed to identical material over the lifeline of the data available.

Student curriculum for this comparison is based upon the *Essentials of Firefighting, International Fire Service Training Association, 4th edition, Oklahoma State University*. The texts, student guides, instructor guides, and student quizzes from this set of training material were utilized for both groups. This material is the standard approved by the State Fire Training agency and is the latest version available. Examples of quiz questions have been obtained from both academy groups and are available for review.

The *Essentials* curriculum is a nationally recognized curriculum that has been adopted by the State Fire Training authority as the approved and certifiable standard. The State Fire Training web site has been reviewed for applicability and can be found under the auspices of the State Fire Marshall and the California Department of Forestry and Fire Protection @ www.fire.ca.gov.

Methodology

The Regional Fire Academy concept is not new to California Community Colleges, however, it is unique to Northern California. As it exists in its present format, the academy stands alone as a vocational based unit sponsored through the Community College System and supported by a single fire department.

Students desiring to attend this academy need only be able to complete the college application, obtain medical clearance to perform strenuous related tasks, and pay the applicable fees. Students attending this academy are aspiring firefighters, who, either don't meet some of the requirements for employment at a municipal department or are beginning second careers in many cases.

Although the format for this academy is similar to that of the comparative study academy, the length of study in hours is shorter than that of the Joint Fire Academy, (here in called the JFA).

With these issues in mind and seeing a tremendous increase in demand and popularity of the Regional Academy, (herein called the "FF-1" or Firefighter 1), it appeared necessary to determine how this academy stacked up against another of like makeup.

The most logical way to accomplish this is to utilize existing data from the Regional Academy and compare it with like data from another source, the JFA.

The Joint Fire Academy in Santa Clara County, California utilizes a similar format and identical curriculum to train firefighters newly hired by participating fire departments.

The decision was made to conduct a simple comparison study between the two separate fire academies. Readily available data for the FF-1 academy were compiled from the past three years time period. Contact with former fire academy coordinators for the JFA's in the past three years revealed like information was available for the same time frame.

Student population information was gathered and it was discovered that more students attended the FF-1 academy (148) during the assigned period than did the JFA (91). To assure that data was consistent, the first 91 students for a like period at the FF-1 academy were chosen. To maintain privacy and security as well as utilize a random selection process, all identifiable information regarding the students, other than scores, were deleted and replaced with sequential numbering from 1 to 91. A random number generator was located on the Internet, www.random.org, and was chosen to select a student list from both populations. Ten numbers were chosen as integers by the number generator and matched with the populations from both groups. These numbers are: 36, 20, 80, 10, 44, 13, 74, 56, 39, and 30. Quiz topics were similarly converted to numbers and ten topics out of twenty-five were selected. The topics, though listed in different orders for each academy, refer to appendix "A", represent the following subjects as listed in table 1 below.

Table 1

Fire Behavior
Water Supply
Hose
Building Construction
Self Contained Breathing Apparatus
Ropes and knots
Ventilation
Incident Command System
Salvage
Fire Protection Systems

The entire set of compiled data, student numbers, subjects and scores are arranged by academy in a spreadsheet format. Scores are tabulated for each subject and an average score for each category is determined. An overall average is calculated for each data set and the mean score established for the Joint Fire Academy as the basis for comparisons. This spreadsheet is available as Appendix "A". Student scores are presented in the universal form of a percentage or factor of 100.

Results/Findings

The study is relatively simple in design as is the anticipated results or findings resulting from compilation of the data. The extent to which the data are significant was a surprise and will be discussed in the conclusions and recommendations section of this paper. By referring to table 2 it is easy to see a representation of the statistics associated with the study. The most illustrative are the differences between the average overall quiz scores for the academies and the standard deviation of the JFA data.

Table 2

JFA	FF-1
Average score	89.66 76.12
Mean	89.66 76.12
Studded	4.2 >-3 Std. Dev
Difference	13.54

Conclusions and Recommendations

The facts illustrate a significant disparity in the overall level of achievement in the student populations. This disparity is so great that it cannot be explained by looking at the scores, curriculum, quality/level of instruction, or other identifiable facets of the program in question associated with the parameters of this report.

There is however that telltale number, a 13.54-point difference in overall average score as posted in percentage points.

The initial hypothesis has been sustained, but, to a far greater degree than anticipated. This is especially surprising given the demand and popularity of the program. The FF-1 academy has supported class sizes of thirty students over a three hundred sixty hour course of instruction while the JFA has boasted a maximum class size of twenty-five over a four hundred hour course, though average class sizes have been smaller.

The implications of these results offer some additional concerns that will require additional study. First, class size is significantly larger on average for the FF-1 academies than for the JFA.

Utilizing total student numbers, it was determined that average class size for the JFA was 18.2 students, while the FF-1 academy supported an average class size of 24.6 students. Several of the FF-1 academy classes have topped a student population of 30. Second, the length of time students attend the academies differs by forty hours each. The FF-1 academy totals three hundred sixty and the JFA totals four hundred hours. Third, and less obvious is the achievement levels of the student populations prior to entry into the academy. The JFA requires students be employed by and assigned by the participating fire agency. Each of those departments has specific minimum hiring standards and requires applicants go through rigid competitive testing where only the top applicants are hired. The FF-1 academy requires students be eighteen years of age and physically capable of completing the rigors of the academy. There are no entry-level tests or competitions. Based on Community College requirements, the Regional Academy is open to all who wish to apply.

Students in the Regional Academy will face larger class sizes for a shorter duration. Students will represent a broader range of society and will not have had to compete with a group that has a different incentive level and possibly a higher socio-economic educational level. This final aspect is not all-inclusive however. Former FF-1 academy students with equivalent education background have competed successfully for jobs in the industry in recent months.

The recommendation for future action is an expanded study that looks at class size, length and student population for vocational education in this field of job training. An alternative, though unlikely scenario, represents inserting applicants for the FF-1 academy into a JFA for a study of outcomes. An additional recommendation is to conduct a comprehensive analysis of the Regional Academy program to determine what, if any changes/improvements can be made.

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