ADVANCED TRAINING FOR TRAFFIC OPERATORS : A FOCUS ON IDENTIFYING AND SOLVING ADVANCED TRANSPORTATION MANAGEMENT AND OPERATION PROBLEMS

by

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ABSTRACT

This thesis is a summary of work performed by the Utah Traffic Lab (UTL) to design an advanced training program that develops the knowledge, skills, and ability of traffic operators to identify and solve advanced traffic management and operation problems encountered at Traffic Operations Centers (TOC). It supports incident management instruction at the highest level and utilizes the advantages of traffic operators who work 24/7 and continually monitor the traffic network through closed circuit television. The thesis explains who is qualified to receive the advanced training program. The specific curriculum containing courses on advanced traffic operation techniques, geometric design, and traffic flow is proposed. The method to measure performance through assessment and evaluation for the advanced training program is also presented. The advanced training program is an effective method to train operators to identify and solve advanced transportation management and operation problems.

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INTRODUCTION

The *Advanced Training for Traffic Operators: A Focus on Identifying and Solving Advanced Transportation Management and Operation Problems* is an advanced training guide designed to help Traffic Operations Centers (TOCs) identify how to better utilize good operators. This thesis discusses some current training methods and the difficulties that some TOCs might encounter in trying to provide more advanced training for their operators within traffic management. It also proposes a method to solve these difficulties including specific components essential to a successful training program. Finally, the results from the training method with some examples of benefits gained from having operators with advanced training are provided.

OVERVIEW

Background

TOCs are put in metropolitan areas to monitor the transportation network and implement intelligent transportation systems to improve the network. Traffic operators are staffed at TOCs to monitor the system with cameras and implement Advanced Transportation Management Software (ATMS) to provide information to the public. It is essential that a qualified workforce of trained operators is present at TOCs to provide effective traffic management.

Good traffic operators are expected to know the area they monitor extremely well and know how to use the ATMS effectively. Good operators provide many benefits to the public by quickly providing information that can help provide safety and reduce travel time. Many TOCs have begun to provide 24-hour traffic monitoring by operators and give more responsibilities to the operators. The increased responsibilities often create opportunities for operators to help other employees, including traffic engineers, at TOCs. However, operators are given the responsibilities often without specific training on how to utilize these opportunities, which include how to identify and solve advanced transportation management and operation problems.

Current Research

State Departments of Transportation (DOTs), like businesses, are facing many challenges in providing a qualified workforce. Some of these challenges include a changing environment at the workplace and a demand from the public for good service. State DOTs must recruit a talented workforce, retain this talent, and ensure that the knowledge and competence of the workforce is both maintained and increased. Many publications have been produced on the procedures to recruit, retain, and train DOT workforces.

The first comprehensive national publication to specifically cover the TOC and its workforce was the Federal Highway Administration's (FHWA) *Comparable Systems Analysis: Design and Operation of Advanced Control Centers* (1). This publication defines the objectives of TOCs and has an entire section dedicated to the staffing, selection and basic training of employees. It does not explain the training of full-time employees or advanced training to solve engineering problems. It highlights basic training observed from the FHWA's visits to 18 TOCs nationwide. The publication states that nothing in the way of formalized recurrent training programs was seen at any of the sites visited in 1995.

In 2002, FHWA produced a more comprehensive publication on staff development, *Guidelines for TOC Transportation Management Operations Technician Staff Development* (2). The publication developed a definition of what transportation management operations technician (TMOT) or traffic operators should do. The traffic operator's responsibilities were separated into tasks, knowledge, skills, and abilities. Then these areas were separated into three levels: entry level, full-performance level, and

advanced level. The publication did not discuss how operators can help TOCs in identifying and solving advanced transportation management and operations network problems.

The National Cooperative Highway Research Program (NCHRP) has compiled a synthesis to help state DOTs meet the challenges of training the workforce. The publication teaches state and federal agencies how to recruit, retain, and maintain their workforce. Their publication, *Training Programs, Processes, Policies, and Practices* (3), states in detail the challenges, the essential components of an effective training program, and the experiences of state DOTs. The publication is not a handbook of how to train operators but a collection of successful programs, processes, policies, and practices gathered from surveys from 16 states.

Various levels of training at a TOC help to retain and increase the knowledge and ability of employees. Training research and programs have recently focused on two areas. The first area is focused on the finding and basic training of new employees (4). The second area is training for large emergency management scenarios such as city evacuation or terrorist response (5,6,7,8). The emergency response training is built by federal agencies and done as a need based training program.

These publications all provide important information on what is currently being done to solve the issues in the recruiting, retaining, and training of traffic operators. However, the training is often focused on the general practices and does not identify how to use the opportunities operators have in TOCs.

Problem Statement

This thesis proposes a specific training program to use the opportunities available to traffic operators by training them how to identify and solve advanced transportation management and operation problems. Important components of this proposal have been found and presented in this research.

1. Establish the definition of a good operator and the preparation needed to give advanced training.

2. Introduce a specific curriculum that develops the necessary knowledge, skill, and ability to identify and solve advanced transportation management and operation problems.

3. Suggest a method for measuring the performance of the operator on the knowledge, skill, and ability gained from the curriculum.

The thesis proposes that a specific advanced training program can increase the capabilities of good operators to identify and solve advanced transportation management and operation problems. It defines the separate components of the advanced training program, including the definition of good operators, the specific curriculum, and ways to measure operator performance of the curriculum and learned capabilities.

METHOD

Good Operators

The NCHRP Synthesis Report 362 states that the value of human capital programs is seen in direct proportion to the program's ability to enhance the workforce capability (3). Advanced training can enhance the workforce capability, which then will make TOCs more valuable to the public, which means provide faster and better information. To accomplish this, training needs to be given that will increase the knowledge, skill, ability, and competency of the operator. The research done by the Utah Traffic Lab (UTL) first identifies the capabilities and duties of good operators. Next, the UTL identifies the preparation a good operator needs to have in order to receive advanced training. Finally, UTL finds the capabilities and duties operators need to identify and solve advanced transportation management and operation problems.

Definition

To determine what a good operator is, the description of a traffic operator and the different levels of aptitude need to be defined. The separation of the levels will be explained including the training practices currently used at these levels.

The description of a traffic operator is described in Guidelines for TMC Transportation Management Operations Technician Staff Development (2).

> A Transportation Management Operations Technician is a person who is capable of working a typical shift in a Transportation Management Center (TMC). A

> typical shift may include operation under congested, non-congested, incident and non-incident conditions. The operator's work will usually consist of direct, "hands-on" accomplishment of tasks necessary to deliver one or more accepted TMC functions. An operator must also be able to show competent knowledge, skill, and ability.

The first level of aptitude of a traffic operator is the entry level. Entry level operators are new employees with no prior work experience in TOCs. They have a basic understanding of their purpose in TOCs and their responsibility to the public. Training for entry level operators includes the new employee or basic training, which can take up to two weeks. Basic training teaches the skills that an operator will need to retain throughout employment at a TOC. These skills can include traffic flow, roadway elements, and the overall understanding of the network (4).

The next level of aptitude is the full-performance level. A full-performance level for an operator should be able to carry out his or her responsibilities with a minimum of supervision, guidance, and direction (2). Operators can be considered full-performance when they have an understanding of the knowledge, skill, and abilities to perform their duties and tasks. Training to reach full-performance is done through recurrent training. Recurrent training helps operators gain important skills that are needed to effectively monitor the transportation network. Recurrent training is commonly given to operators in the form of monthly meetings or instruction from other operators. Recurrent training to entry level employees should be given from one to two years until the full-performance level is met.

A good operator is an operator who can perform all the capabilities and duties of a full-performance level operator. The capabilities of a full performance level operator may include:

- Manage multiple incidents at once
- Use all ATMS software effectively
- Understand all interchanges
- Reporting emergencies on 511/website
- Communicate with invested partners
- Work with no supervision
- Implement special event signal timing plans
- Fill a work order
- Issue a J-page
- Use TATS.

Not all full-performance level operators are considered good operators or are good candidates to receive the advanced training program. There are other traits shown by the operator that help to determine good candidates. Some key traits that have been identified are what the operators do in their spare time, the operators' attention to detail, and a general interest shown in traffic and the TOC by the operators.

Preparation

Good operators help TOCs run smoothly in their duties to manage and control traffic in a transportation network. Good operators may start to receive more responsibilities because they show the knowledge, skills, and ability to accomplish all duties and tasks given to them in prior training. The level of aptitude where an operator with these responsibilities belongs is the advanced level. Prior research has identified the general qualities of an advanced level operator as follows (2):

> An operator should be able to perform independently as an expert in the majority of functions at a TMC. Attainment of this level is measured by combining operator experience with advanced training and may also vary by the specific functional requirements of a TOC. The operator's job duties may be similar to those performed by a full performance level operator, but to exercise these duties by only receiving guidance about overall TOC priorities.

Figure 1 shows the process an operator follows to reach the advanced aptitude level. An operator that seeks to reach the advanced level must be fully capable in all the duties and tasks at each previous level. Other preparation in receiving advanced training is that an operator must show an ability to work with others and take interest in situations that are beyond the entry and full-performance level tasks and duties. Some situations may include an operator notifying supervisors of areas of congestion at non peak hour times or an operator suggesting better camera locations to supervisors.

Specific Curriculum

A specific curriculum that helps good operators develop the necessary knowledge, skills, and ability is an essential part of the advanced training program. The curriculum is designed to teach them to identify and solve advanced problems that other TOC employees, specifically engineers, handle. The curriculum was divided into three different courses to accomplish this goal. Figure 2 shows the divisions with the subjects addressed in each course.

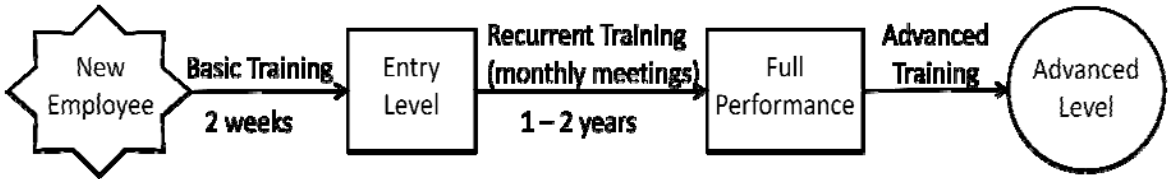

Figure 1: Levels of Operator Performance

A structured curriculum will help TOCs meet the overall goal to develop valuable employees, monitor the transportation network, and identify and solve transportation problems. The curriculum presented will help good operators obtain the specific capabilities to perform many of the responsibilities that are given to them. The capabilities that an advanced level operator should be able to complete are:

- Handle difficult phone calls
- Hazardous material (HAZMAT) response
- Fix broken traffic signal timing
- Identify all road elements
- Calculate superelevation
- Lead – train other employees
- Understanding of traffic flow theory
- PeMS – Report delay times
- Work zone management
- Ramp-meter management.

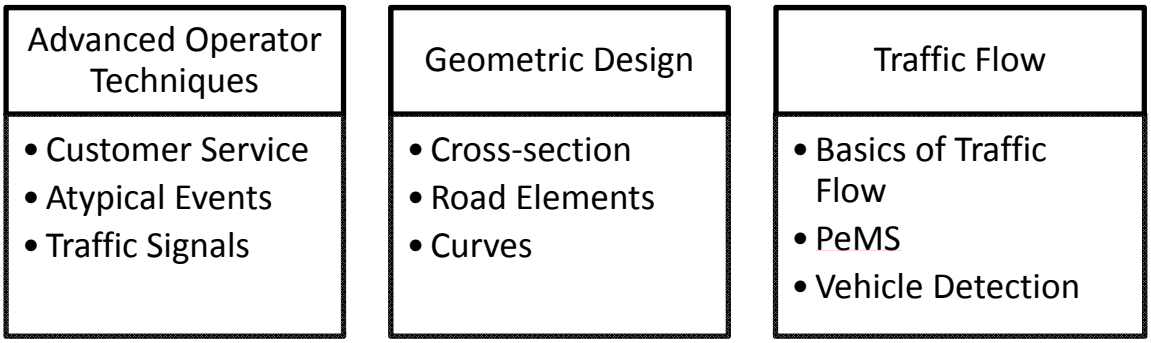

Figure 2: Curriculum for Advanced Training

Advanced Operator Techniques

The first course in the advanced training curriculum is called advanced operator techniques. An operator who has received basic training and reached the status of a good operator should be able to understand the transportation network and use the advanced transportation management system software effectively and efficiently. This course trains operators advanced customer service skills, knowledge to respond to atypical traffic crises, and information to mange traffic signals. The advanced operator techniques course develops the capabilities of good operators to identify and solve the advanced transportation problems in operations.

The interaction between the operators and the public and media, often referred to as customer service, is the first subject covered in the advanced operator technique course. This interaction improves upon the full-performance level and helps develop capacities for the daily task. TOCs are information centers; they monitor the conditions of the transportation network and have access to all DOT agencies. To make use of the information the TOC provides a direct phone line to the operators that they are required to answer during their shift. This means that part of the traffic operator's job is to answer phones and use customer service techniques to successfully provide the information to both the public and the media.

The customer service aspect of the traffic operator's duties can create challenges and must be handled appropriately. Techniques on how to handle the challenges of customer service and phone etiquette are addressed in the course. Figure 3 describes how operators can create a good first impression on the phone and on what criteria a customer will evaluate them on. Operators are taught to be polite, informative, and professional.

Figure 3: Customer Service – First Impressions

The qualities that are needed for good customer service skills include listening, giving verbal feedback, using the caller's name, and working to provide immediate feedback. These qualities are emphasized in the training.

Responding to atypical or emergency situations is taught in the next subject. The purpose of this subject is to inform the operators of their responsibilities and the actions they must take in these situations. An atypical situation is defined as any severe weather hazard or HAZMAT incident. Atypical events occur with little to no warning and require the operator to seek help from a supervisor to resolve them.

The final subject covered in the advanced operator technique course is how to use the traffic signals at an operator level. TOCs usually employ engineers to develop and manage traffic signal timing plans. It is not the responsibility of the traffic operator. Understanding how to use the traffic signal software and how to implement created planes can be an asset for the operators. The principals taught to the operator in the advanced training are how to implement a signal plan, how to deal with signal timing software in non working hours, and how to better understand the basics of signal timing plans to identify problem areas.

Geometric Design

The next course in the curriculum is a geometric design basics training. Geometric design is the understanding of the road itself, the cross-section, road elements, and curvature. Understanding the road will help operators determine if problem areas are driver error, poor maintenance, or road geometry related. Operators study the road looking for traffic incidents. By learning the geometric design training the operators will begin to look for geometric design problems as they look at the road. The geometric design course is focused on the identification of advanced transportation problems.

Three subjects; cross-section, road elements, and curvature, are taught as a foundation of roadway design. These subjects are mathematically intensive and to teach them successfully, a specific level of comprehension for operators needs to be obtained. The author determined that safety was the primary goal in the outline of this course. By implementing safety into the courses, the proper level of comprehension was established in the geometric design course.

Cross-section design is the understanding of travel lanes, shoulders, and the physical separation of opposing directions of traffic. In the training, a common travel lane width of 12 feet is established. It is then explained as the lane width decreases, the comfort of the driver declines and travel speed reduces while incident frequency increases. Standard side slope is 6:1; the increase of the slope amplifies the severity of an incident. Figure 4 is a slide taken from the geometric design course. This figure is describing the elements that are taught in the cross-section subject.

The topics covered in the road element subject of the course are striping, barriers, and signage. The standard of each element is taught so the different types and purposes

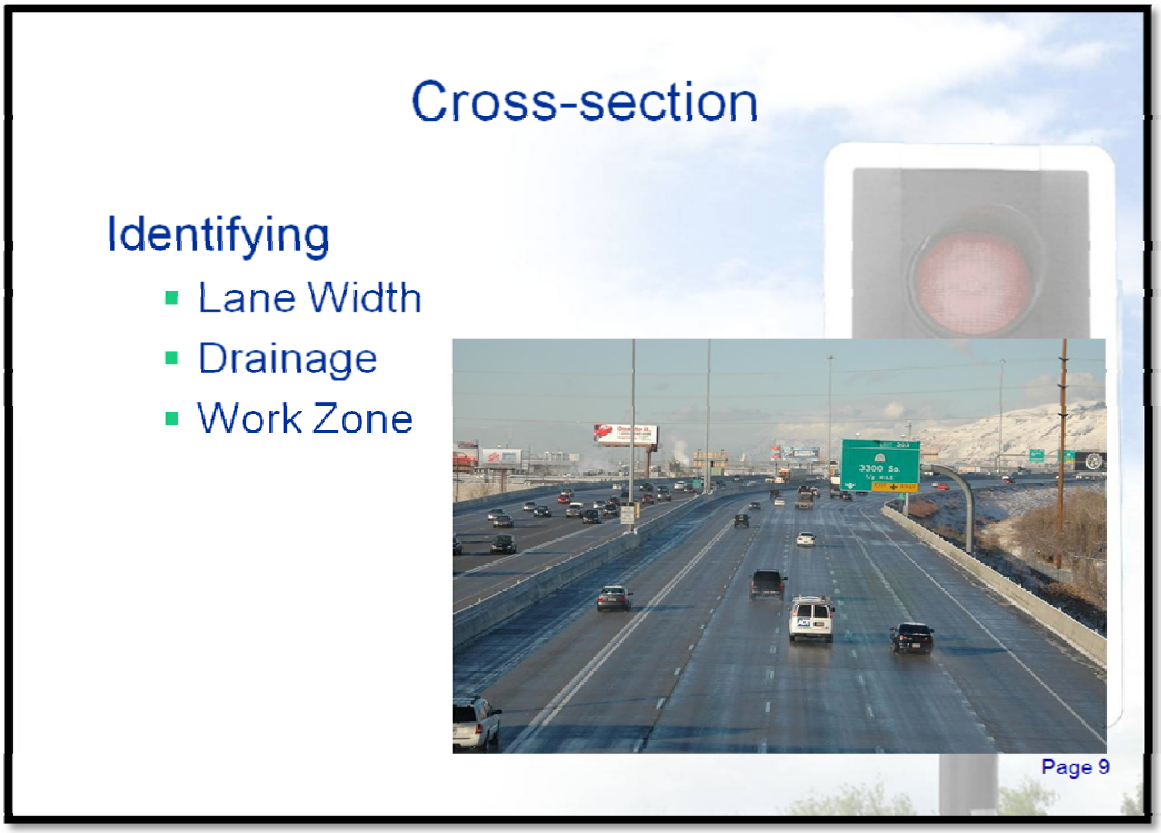

Figure 4: Cross-section

are known. Knowledge in the roadway elements helps the operators to find improper use and identify correct alternatives.

The final subject covered in the geometric design course is horizontal and vertical curve design. A traffic operator is not expected to design curves but have knowledge of the variables that are needed and identify the unsafe part. The basic components of superelevation, stopping sight distance, and design speed are taught. The safe values are identified and given in the training.

Traffic Flow

The final course developed in the curriculum is the traffic flow training. Understanding traffic flow is a key element in traffic management. FHWA defines traffic incident management as the planned and coordinated process by multiple agencies to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. Having an understanding of capacity, flow, and demand, the basic elements of traffic flow, helps operators see how efficiency in traffic management can benefit the travel time of the users. The other subjects covered in this course are the Performance Measurement System (PeMS) software usage and traffic monitoring through vehicle detection technologies. The traffic flow course will help good operators identify and solve advanced transportation problems in transportation management.

Traffic flow theory is a way of describing the mathematical ways in which vehicles, drivers, and the infrastructure interact. This theory is an essential part of the design and operations of streets and highways. Traffic flow theory consists of knowing the terms of speed, density, capacity, and flow as it pertains to transportation. These

terms are defined in the training for the operator; the relationship between the terms is also explained using the Greenshields model. Figure 5 shows how the terms are modeled using the Greenshilds approach. The basics of how they relate to one another including terms and equations are also taught. The traffic flow theory is beneficial to operators because it helps them understand how an incident can reduce the capacity of a freeway. When the capacity is reduced the flow and performance of the freeway is reduced, causing delays. Knowing that a faster response to an incident will reduce the overall delay of the freeway can help the operator work more efficiently and act more serious at work. Understanding the traffic flow theory is essential to learning the next subjects in this course.

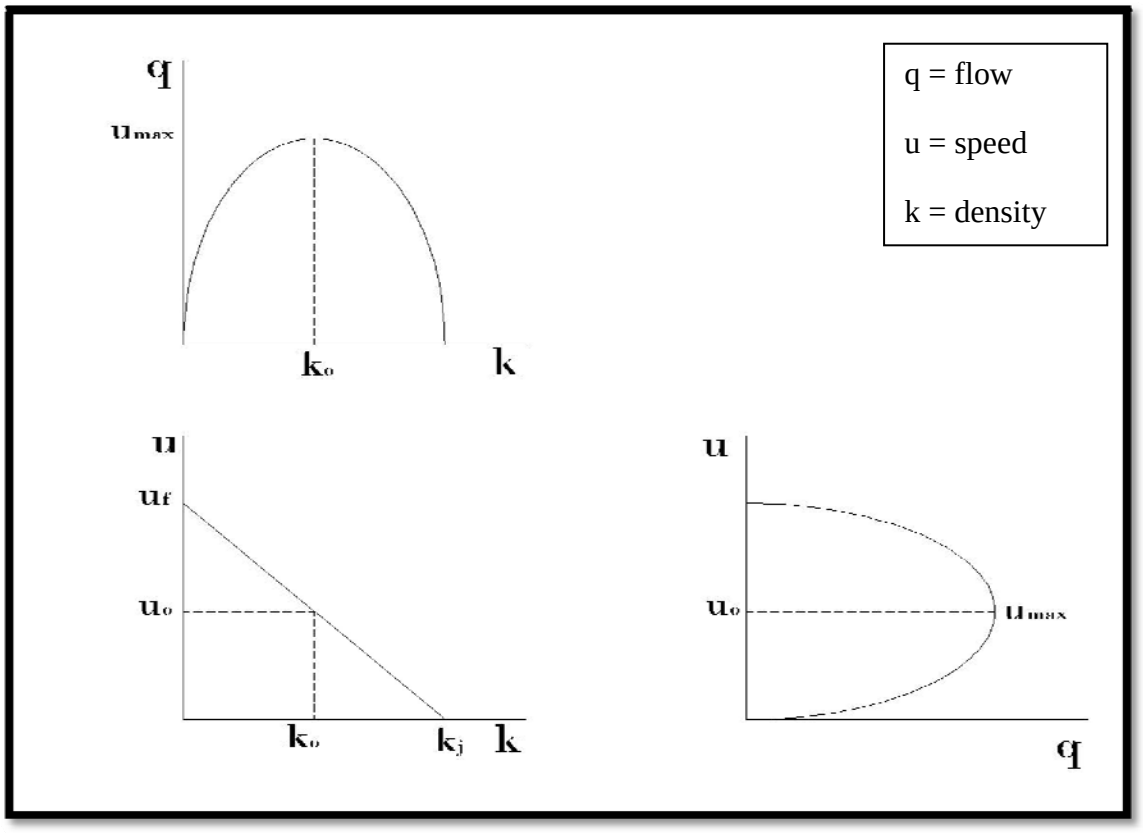

Figure 5: Greenshields Model

PeMS is software that collects data on the freeway system in Utah. The collected and stored information is speed and flow data. These data can be used to determine the trends that occur due to recurrent and non recurrent congestion. The software can also be used to determine the delay time that an incident can cause. The training for this subject consisted of teaching operators how to use the software and how to calculate delay times. Delay times are calculated by taking the historical data and reducing the capacity by a reduction of lanes caused by an incident. The delay time is reported to the media and reported on variable message signs.

The final subject covered in the traffic flow course is an introduction to vehicle monitoring technologies. This subject helps operators understand how and from what sources TOCs get their traffic flow data. This subject introduces six different vehicle detection methods and explains what information they provide. The importance of vehicle monitoring in traffic management and TOCs is explained. The level to which the operators need to understand the vehicle detection technologies is also presented in this subject. The six detection methods are inductive loops, magnetic detectors, passive infrared system, ultra-sonic detectors, microwave radar, and video detection systems.

The advanced training curriculum delivers the necessary information to develop the knowledge, skill, and ability to prepare good operators to work at the advanced level. Figure 6 illustrates the process to attain the advanced level. The curriculum should be given in a two week period but it does not automatically qualify operators as advanced level. A measure of the how well the operator can apply the information needs to be determined after six months to a year after the training, which is enough time for operators to master the information taught in the advanced training curriculum.

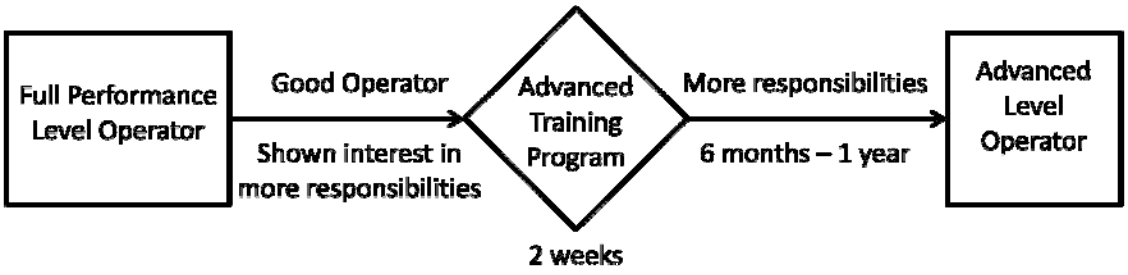

Figure 6: Good Operator Progression Through Advanced Training

Performance Measuring

The final component of the proposal is to suggest a method for measuring the performance of the operator on the knowledge, skill, and ability gained from the curriculum. Performance measuring is the process of identifying current knowledge, skill, and ability and determining how well the trainees have learned the training and how effective they are at applying the training. Performance is measured on how well operators perform including identifying and solving advanced transportation management and operation problems. Three additional publications were used to help in the formulation of this specific performance measurement system, two from FHWA (9,10) and one from the Transportation Research Board (11).

The performance measures are a balance of quality and quantity. The quality of the performance measures needed should be comprehensive enough to assess the knowledge, skill and ability both of what is already known and what is taught. The quantity of the performance measures is found to assure that the evaluation does not become too cumbersome. The result from the performance measuring also needs to provide a way to help revise and improve the training service, quality, and productivity.

The quality of the performance measures can be evaluated against the Kirkpatrick Four Level Model of training evaluation (3). This ensures that the assessment and evaluation processes will accomplish their purposes of helping the operator understand the training and retain the information.

1. Student reaction – "What they thought and felt about the training."

2. Learning – "The resulting increase in knowledge or capability."

3. Behavior – "The extent of behavior and capability improvement and implementation and/or application."

4. Results – "The effect on the environment resulting from the trainee's performance."

The new method of performance measurement developed for the advanced training is that both assessment and evaluation methods are used. The performance measurement for the advanced training gives an assessment of current employee levels through a checklist method. Next, an evaluation of the advanced training is given to the trainee consisting of short answer and problem solving questions. Finally, the frequency and duration of the performance measurement is given.

Assessment Through Checklist

The assessment of current employee knowledge, skill, and ability levels is developed in the research and given by the employee's supervisor. The checklist was modeled after the generic activity groups presented in the staff development FHWA publication (2). Three checklists were developed for the basic, full-performance, and advanced levels. The checklists follow the quality and quantity guidelines and limit the number of performance measures to no more than 10 specific areas of assessment. The

checklists are valuable in finding the strengths and weaknesses of each employee and allow the supervisor to focus on the development of the employees. The checklists follow the capabilities so that the supervisor and operator know exactly what the expected performance should be.

The basic level checklist measures the knowledge, skills, and ability of an employee after the basic training and two full weeks of on the job experience. The areas are measured by marking if the employee is at a certain capabilities as shown in Figure 7. The three levels of capability are not capable, needs work, and fully capable. The areas of assessment for the basic level are:

- Hearing incident and using radios
- Create correct VMS signs
- Create an incident on IMS
- Select and orient cameras

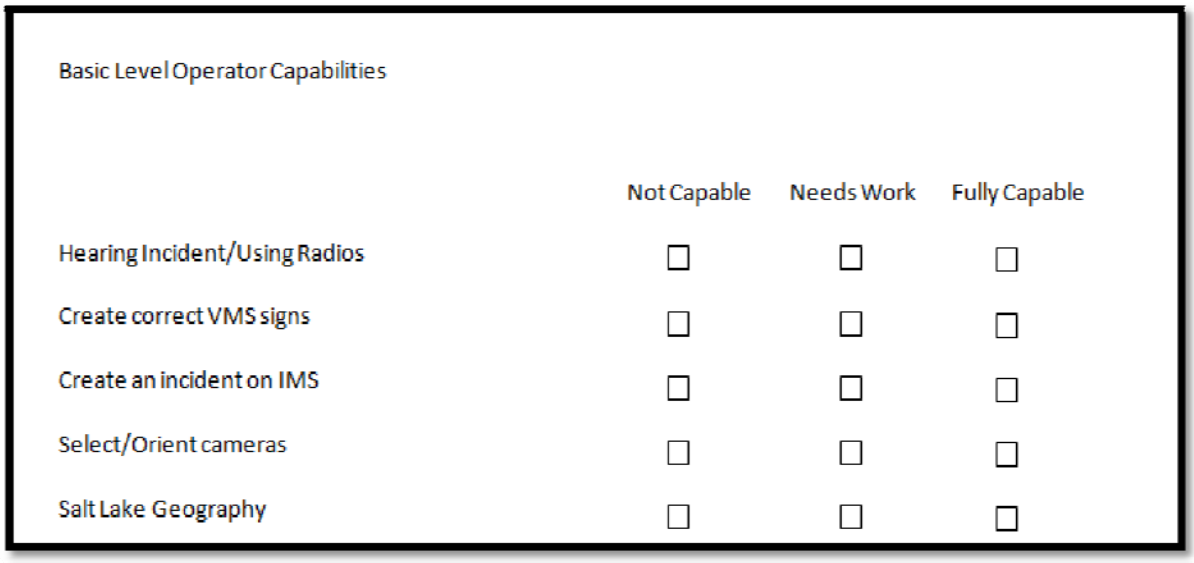

Figure 7: Basic Level Checklist

- Salt Lake geography
- Overall geography
- Communication with other operators
- Reading CAD system
- Willingness to learn
- Productive during down time

The full-performance level checklist is given to an employee six months to a year after the basic level performance is achieved. The full-performance level is the level at which an employee can work an entire shift and do the day-to-day tasks without supervision. The areas of assessment for the full-performance level are:

- Manage multiple incidents at once
- Use all ATMS software effectively
- Understand all interchanges
- Reporting emergencies on 511/website
- Communicate with invested partners
- Work with no supervision
- Implement special event signal timing plans
- Fill a work order
- Issue a J-page
- Use TATS

The advanced level checklist is given to the employee after the advanced training and after a month of using the knowledge and skills that were learned. The areas of assessment for the advanced level are:

- Handle difficult phone calls
- HAZMAT response
- Fix broken traffic signal timing
- Identify all road elements
- Calculate superelevation
- Lead – train other employees
- Understanding of traffic flow theory
- PeMS – report delay times
- Work zone management
- Ramp meter management

Evaluation After Training

Evaluation or testing of the employee after training is critical to determine what was learned and how capable the employee is of applying the training, specifically in identifying and solving engineering problems. The following steps were used in creating the evaluation for advanced training. The information is from the FHWA Handbook for Developing a TMC Operations Manual (10).

1. Identify the critical activity.
2. Identify the goals and objectives of the activity.
3. Develop a set of candidate performance measures.
4. Identify performance targets.
5. Compare actual performance to targeted goals.
6. Determine corrective actions or progress needed to achieve goals.

The critical activities or tasks were identified for each course in the curriculum. These tasks were then compared to the goals of the training. The questions were then created to both help employees apply the tasks that were learned and fulfill the goals set in the training. The number of questions for each course followed the quantity and quality guidelines. The questions evaluate the employee's understanding in ten questions.

Two techniques are used in the evaluation, short answer and problem solving questions. The two techniques are chosen to help employees retain more information. The short answer evaluates employees on what they remember from the training. These questions are often easier and can appear multiple times. The method of learning that this technique uses is short-term memory recall and repetition. Problem solving problems require more thought and the actual application of the principals taught in the training. The problem solving technique uses the critical thinking method of learning. Figure 8 is an example of the short answer and problem solving question.

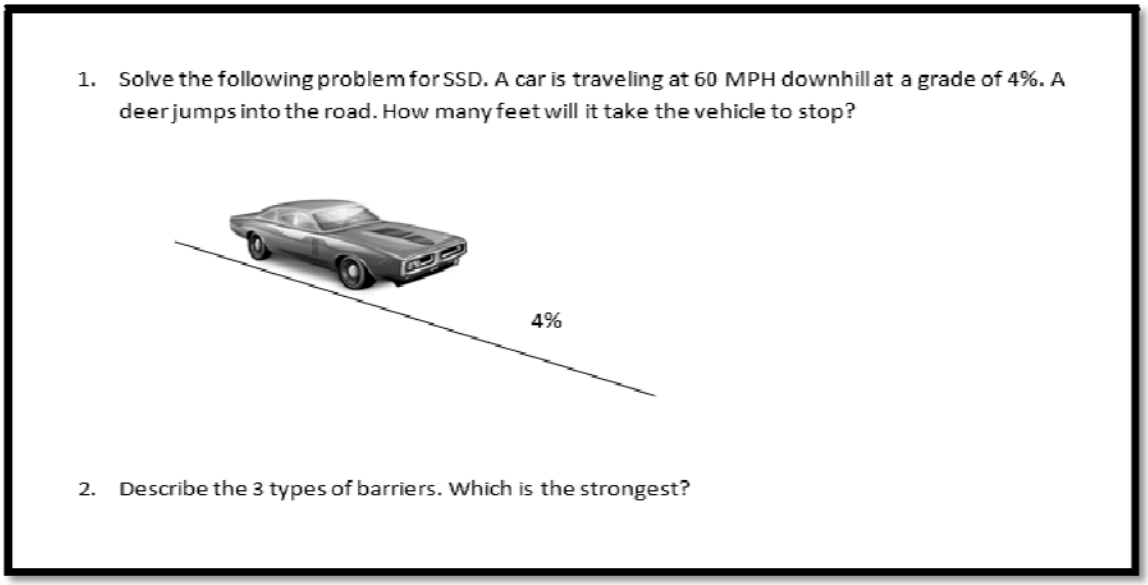

Figure 8: Evaluation of the Geometric Design Course

RESULTS

The advanced training program as proposed in the method section does increase the capabilities of good operators to identify and solve advanced transportation management operation problems. It accomplishes this by helping TOCs identify which operators qualify for the training, providing a specific curriculum, and providing a way to determine if the curriculum was successful in its training.

As the advanced training program was given to operators, several questions began to arise such as “Does increased responsibility mean increased performance?”. This question is an important one because if no noticeable increase in performance at a TOC is seen, why implement the advance training program? If operators correctly apply the training then they can identify problems in the transportation network and solve the problems from the skills gained through the training.

An example of that was found in the process. This specific example illustrates the knowledge gained in the advanced operator techniques course in solving a traffic signal problem. TOCs usually have control of the signal timing plans of cities and in Utah the public is encouraged to call the operators if there are signal timing problems. Traffic signal engineers work a standard 8-hour shift, so if a problem occurs during non-working hours the signal timing plan is noted and left to be fixed until the next day. An operator with signal timing knowledge can fix the problem immediately and improve the performance of the system.

Another question found in the advanced training program is whether it provides benefits to the shareholders, which can include the public, the TOCs, and the operators. An example showing the benefits of the advanced training program was found while teaching the geometric design course in the identification of poor design by an operator. Traffic operators manage incidents to inform the public of the incident and help reduce delay times. If an incident occurs in the same location frequently, it may be caused by bad design. An operator with advanced training can identify the problem as curvature design, narrow lanes, or insufficient merging distance. The problem can be reported to engineers at the TOC and potentially increase the performance of the network.

The delivery of the advanced training program was another problem that was discovered in the research. There are different methods in which training can be given to operators: PowerPoint, teacher-led seminars, or web-based delivery. The first method of delivering the curriculum was an instructor-led power point presentation. This method allows for direct iterations of the courses because the feedback is given immediately and directly from the trainees.

The benefits that these examples provide to the public is that certain problems can be fixed anytime of the day by advanced level operators and congestion can be reduced by identification of poor design. The benefits to a TOC are that problems can be identified by observation of unusual congestion and TOCs will have more qualified employees in their workforce. Finally, advanced training can benefit operators by increasing the competency and responsibility at TOCs.

CONCLUSION

The advanced training program is designed to train traffic operators at TOCs to identify and solve advanced transportation management and operation problems. The thesis proposed to satisfy three components in operators training.

1. Establish the definition of a good operator and the preparation needed to give advanced training.
2. Introduce a specific curriculum that develops the necessary knowledge, skill, and ability to identify and solve advanced transportation management and operation problems.
3. Suggest a method for measuring the performance of the operator on the knowledge, skill, and ability gained from the curriculum.

The first component is satisfied by defining a good operator and by creating a progression map for operators. The second component is satisfied by the development of the curriculum presented which include courses in advanced operator techniques, geometric design, and traffic flow. The final component is satisfied by the performance measurement system that uses assessment and evaluation methods. The performance measuring is a direct and concise method in determining how well the curriculum was received that can easily be used by the operators' supervisor.

The advanced training program is a specific program that will help direct TOCs in the advancement of their traffic operators. The training program deviates from the

traditional methods of placing more responsibilities gradually on good operators. Instead, it focuses on a structured training method that prepares operators to identify and solve advanced problems and to share the results with other TOC employees.

The advanced training program is recommended to TOCs that have 24-hour, 7 days a week, transportation monitoring operators. The advanced training program is also recommended to TOCs that want to improve the production of operators. The method for the delivery of the advanced training program that is recommended is an interactive training program from a web based program or CD. The benefit of having a completely electronic training program is that the operator can receive training at any time. The instructor-led training method can result in lost time by operators. This training program can provide many benefits to help TOCs meet the demand for service from the public and their own goals of providing a reliable and efficient transportation network.

CONTINUATION OF RESEARCH

There are opportunities for future study in the UDOT TOC advanced operation training project. The research can be divided into three areas: basic training, advanced training, and table top scenario simulation training. Each area will be discussed in a bulleted list below.

- Recurrent Training

  Create a recurrent training program that will help operators understand the UDOT approved procedure of handling:

  Large incidents

  VMS practices

  Emergency and unusual situations

  Hold a “think tank” meeting to determine procedures

- Advanced Training

  Begin advanced training to good operators

  Develop interactive training module that can be given on a CD at any time

- Scenario Simulation Training

  Develop training program

  Implement training program to TOC employees

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