

Developing Critical Thinking through Forensic TTX A Reflection Paper

Sharon M. Derrick, PhD, D-ABFA, Texas A&M University-Corpus Christi

S.M. Derrick, PhD, D-ABFA is the Coordinator of the Forensic Sciences Program, Life Sciences Dept., TAMU-CC College of Science and Engineering.

Abstract

Critical thinking is the foundation of the forensic sciences. Forensic agencies use TableTop exercises for testing response plans, team-building and honing problem-solving skills. A TableTop exercise based on a fabricated emergency scenario is an opportunity for college students to develop critical thinking through professional role-playing where they assess the quality of evidence, solve problems, and face the life and death impacts of unequal distribution of resources to certain groups. Integration of a forensic TableTop into the curriculum of an introductory-level college science course is described.

Introduction

High school seniors routinely approach the choice of entering college as the means to obtain a desired career, one which can provide a sufficient salary, and which can also be enjoyable. Those are worthy goals. However, while we professors have them in our classrooms, we must engage students in exercises that improve critical thinking processes in order to fully educate them. A fully educated college graduate should be able to examine data, whether it is actual scientific evidence, political rhetoric, a tweet, or a pop-up advertisement on their computer screen and make an informed logical decision as to the veracity of the facts or opinions provided. This ability shapes the course of the student's life by informing their worldview, influencing the thinking of their spouse, partner, friends, and colleagues, and likely impacting the next generation through their children. Integration of active learning pedagogies in the college or high school classroom is not a novel proposition as many excellent educators have incorporated stimulating exercises into their curricula rather than relying only on the didactic lecture format (Pang, 2010, Rao et al. 2012; Shukla, 2021; Wendland et al., 2015; Worthington, TA, 2018).

Wendland et al. (2015), describe a new critical thinking pedagogy that goes beyond the traditional "pro and con classroom debate". Their method, entitled "thick critical thinking" is rooted in a concept borrowed from cultural anthropology, "thick description," originally conceptualized by Clifford Geertz (1973). Geertz expounded on the need for immersion within a culture in order to scientifically study and perhaps fully understand how the different facets of the culture come together to work successfully for the people within that culture. Cultures are complex entities with practices that are often misunderstood by those from outside the culture. Therefore, Wendland and co-authors adapted the "thick" concept and have been able to show that students who are required to work within a group to solve a complex situation tend to become more comfortable with complexity. The authors also report that after the group experience, the individual students become less likely to explain complex social issues with a pat answer they have heard repeated somewhere before.

One innovative example of active learning in the classroom is described by a forensic science professor in India, R.K. Shukla (2021). Shukla describes the complex nature of the multiple forensic science fields and his success utilizing active learning in his courses by developing six pedagogical modules around teaching the forensic sciences. The pedagogies include interaction, discussion, and problem based

learning during investigation of a fictitious crime scene. Shukla states that forensic science is one of the most captivating subjects that can very easily entice students.” (2021, p. 1) and they become invested in the classroom activities. However, Shukla focuses on crime scene investigation and evidence-gathering curriculum in his courses, rather than management of a complex, multi-agency, multi-disciplinary response to a large event.

Bringing a TableTop exercise (TTX) to the college or high school classroom is not a novel proposition either (The National Seminar and Tabletop Exercise Series, NTTX). Utilization of these exercises in the public schools and on college campuses is relatively common, but they are typically based on drilling the students to prepare for an active shooter or similar event occurring on campus (campussafetymagazine). Hence, the purpose of this paper is to share a critical thinking exercise I have developed and integrated into two of my university-level introductory forensic science courses. This forensic TTX is modeled on professional forensic practice and incorporates the current interest of young people in the work of forensic scientists.

The following sections listed here describe the use of the forensic TTX to encourage the students to practice critical thinking. A step-by-step illustration of a forensic TTX experience similar to one in which my college-level students have participated is included.

- Critical Thinking in the Forensic Sciences
- Developing Critical thinkers through a Classroom Forensic Tabletop Exercise
- Creating and Implementing a Forensic TableTop Exercise
- Conclusion
- References

Critical Thinking in the Forensic Sciences

Critical thinking is the foundation of the forensic sciences, which are essential to the modern criminal justice system (Forensic Science, U.S. Department of Justice 2021). Critical thinking has been described as “utilizing logic to replace ‘distorted thinking’ with thinking based upon reliable procedures of inquiry” (Burbules and Berk, 1999). The modern forensic scientist analyzes evidence based on this fundamental premise. The fields of the forensic sciences are highly varied in methods and training. They include anthropology, chemistry, criminalistics, engineering, molecular biology (DNA) pathology, odontology, and toxicology, to list a few (AAFS.org/membership-requirements; Shukla, 2021). During my 12 years of experience working as a forensic anthropologist at a large urban medical examiner office with a seven-discipline crime laboratory, I often received evidence delivered to the office by law enforcement through evidence intake, and I observed forensic scientist colleagues receiving evidence in the same manner. However, many times our scientific field expertise was needed at the scene of death or scene of a crime, and we responded to collect our own evidence samples. Forensic scientist responders work at the scene to collect all items relevant to our laboratory analyses. Then we continue our work in the laboratory utilizing logic and epistemology gained through accepted methods to determine what information is true, what is false, and what is irrelevant. This examination of the evidence, both at the scene and in the lab, is a complex process, which requires strong critical thinking skills.

Forensic professionals recognize that regular training seminars and conferences are necessary to sharpen their skills and keep pace with current methodological improvements. For example, the American Academy of Forensic Sciences annual conferences in which lectern presentations, seminars, workshops, and poster presentations are available are typically attended by approximately 5000 forensic professionals each year (<https://www.emedevents.com/c/medical-conferences-2020>). However, in addition to conferences and workshops, my colleagues and I also participate in professionally-led TTX to plan for scene deployment and management if we are faced with an emergency event involving mass injuries,

fatalities, or some other emergent danger to the community or nation (<https://preparedex.com/5-benefits-conducting-tabletop-exercises>).

Developing Critical Thinkers through a Classroom Forensic TableTop Exercise

After an interesting and enjoyable career as a full-time county government forensic anthropologist, I made the transition to teaching, working in an academic laboratory, and coordinating the forensic sciences program at Texas A&M University-Corpus Christi, located on the Texas coastal bend. In my previous role, I was considered a “first responder” to mass casualty/fatality emergencies. Therefore, training in National Incident Management System courses (NIMS Implementation and Training, FEMA.gov) was required in order to learn the command framework for disaster events. Post-training, I have participated in multiple TTX.

A forensic TTX is typically an organized round-table facilitated discussion of a fabricated but realistic emergency event that government agencies may be required to manage in the future. The various professionals are assigned roles based on their agency responsibilities and their individual specialties, becoming participants in the response to the event. During role-play, the participants articulate “near real” planned responses to the event, assess the speed, efficiency, and efficacy of their agency and team actions based on previous planning, and use the TTX to evaluate the potential response to a future real event with similar characteristics (preparedex.com). Throughout the TTX, red herrings and new twists and turns are presented to the participants, which require assessment, decisions, and swift reactions. Further unexpected mayhem may ensue, and victims must be triaged for injuries or deceased victims transported to the regional medical examiner office. A second scene location may be revealed. The redistribution of responder resources, including human actors, must be rapidly considered and action taken. Indigent residents of the area may need assistance to find medical care and temporary lodging. These unexpected “inputs” encourage individual and group problem-solving, both of which are essential to development of critical thinking processes. Murawski (2014) opines that “critical thinkers tend to see a problem from many perspectives, to consider many different investigative approaches” before taking action. In a TTX scenario, the participants practice achieving focus and moving through these brain gymnastics quickly in order to solidify a considered opinion and act within the time allotted.

When I moved to the academic setting to teach forensic science courses, I recognized the potential value of a TTX for students enrolled in the forensic sciences program. Yet, students in other academic programs can also benefit from a forensic TTX experience. It is an entertaining opportunity for college students to develop their critical thinking powers through forensic professional role-playing. The exercise requires the students to assess the quality of the faux forensic evidence, make life and death decisions for the imaginary victims and first responders, and face the reality that certain groups of people have unequal access to resources when trying to survive an unexpected traumatic event. The requisite red herrings and twists/turns are important to the process. After the main TTX is completed, the students and instructor review the performance of the emergency response through a detailed “hotwash” discussion session described below. The hotwash serves as a final critique and can be used to cement some of the skills and principles learned during the TTX before they slip away.

Creating and Implementing a Forensic TableTop Exercise in the Classroom

Importantly, there is little to no cost associated with the exercise. The TTX is fueled by the creativity of the students and the instructor, Internet research, and the basic digital resources available to students enrolled in the college or university. Access to digital slide show software, such as Microsoft PowerPoint, which is almost ubiquitous in the classroom, (blogs.chapman.edu/academics/2017/11/17/) is very useful. A successful TTX does, however, require imaginative planning and a good deal of organization. The students must be integrated into the planning stages to encourage creative participation and ownership of the exercise. The following Steps One through Five provide a structural example of a forensic TTX that I developed and implemented in my courses at TAMUCC based on my experience as a participant and

facilitator in several forensic TTX. However, the content is up to the creativity of the instructor and the students as long as care is taken to protect students from any possible emotional harm (Cebula et al., 2022)

Step One: Secure a convenient available space on campus as a temporary alternative to the lecture hall for one-two weeks of class because a lecture hall with front facing fixed seating is an unsatisfactory location for an exercise that relies on facilitated discussion (www1.nyc.gov). The cascading, fixed seating of the lecture hall reduces engagement among the students and between the instructor/facilitator and the students (dailytrojan.com/2019/10/08). Depending on the number of students in the class, the participants should sit at a large conference table or at multiple tables arranged in a rectangular or circular formation. The conference table arrangement is fundamental to the TTX to physically promote face to face interactions, discussions, and decision making.

Step Two: Prior to moving to the alternative classroom, provide strict behavioral interaction ground rules to the student participants and express the consequences of bending or breaking those rules. Depending on the maturity level of the students, some instructors may feel the need to have the students sign a behavioral statement (example: Tip-Sheet-Behavior-Contract available at my.Vanderbilt.edu, 2013). Next, fabricate the emergency scenario in concert with student suggestions. Some examples of potential TTX scenarios include:

- tall building collapse
- volcanic activity and eruption
- earthquake
- major hurricane/typhoon/flooding event
- release of poisonous gasses or deadly infectious disease spores in a populated area
- a terrorist attack with hostages
- a large explosion (intentional or unintentional)

Ensure that the chosen scenario is of sufficient complexity to support participant decisions requiring the practice of critical thinking. Epistemological categories of knowledge should be discussed as a basis for decision making during the TTX. Although it may be helpful to use prior real events as a basis to encourage creativity, it is important to ensure that the scenario does not mirror the actual incident or involve an incident type in which a student or someone close to them has been involved. Accessing information from at-risk students can be facilitated by requesting confidential emails or instructor office hours visits to privately discuss any tragedy affecting a student's life that might trigger anxiety or depression if the student takes part in the TTX (Cebula et al., 2022). A different scenario can be planned, or alternative assignment options may be offered to these students.

Step Three: Once the basic event scenario is agreed upon, ask the students to research the appropriate response agencies, responders, and scientists and generate a list for the TTX. The NIMS chain of command structure and prepared forms available at FEMA.gov under NIMS Implementation and Training (<https://www.fema.gov/emergency-managers/nims>) are valuable tools to use during this instructor-mediated class discussion. The NIMS paradigm supports a strong chain of command and hierarchy, with an Incident Command Center at the top of the hierarchy. A public information officer is included in the Incident Command staff and typically is the only participant who is authorized to report information to the public media. The Incident Command structure forms the framework of the TTX, although the classroom TTX structure will of necessity be much simpler than the complicated NIMS professional structure .

One helpful character/responsibility I have implemented in the classroom forensic TTX that may not be obvious is selection of one to three members of the external "press" who receive updates from the

Incident Commander's Public Information Officer (PIO). During the TTX, these reporters release both accurate and false information to the public, generating a need for the participants to think critically about the accuracy of the broadcasts and whether the disseminated "facts" are acceptable to believe and act upon.

Step Four:

The TTX begins in the alternative conference table classroom. The participants know the command structure and the basic scenario. They gather in groups around the table(s) based on agency membership and responsibilities. As the TTX evolves, pieces of information are shared as necessary. The participants evaluate the information based on what they know or think they know. Each decision has a consequence in the "game" so choices must be based on conceptual understanding and logical thinking processes. The participants must consider a) where the information originated, b) is it true and verifiable? c) should it be acted upon? and d) what is the correct action? The length of Step Four is based on the complexity of the emergency event and the amount of classroom time reserved for the TTX.

Step Five:

The TTX concludes with the hotwash. This portion is Instructor-mediated and should focus on the positive, followed by a discussion of suggested improvements to the planned "Response".

Conclusion

The transition from employment as a full-time forensic anthropologist at an urban medical examiner office and crime laboratory to Texas A&M University-Corpus Christi as a forensic sciences professor was a major challenge. I had no previous curricula developed and I had to plan the new courses I would teach from the ground up. I had lecture experience using digital slides at professional conferences. That type of teaching would do for some class periods, but I also wanted to engage the students steeped in the popular culture of theatrical forensics to think more critically and to understand the role of the scientific method applied in the disparate forensic science fields. The plans to integrate TTX into my courses grew from that need and the TTX's have been a positive addition to the curricula. I am pleased to share this TTX step-by-step recipe with the readers and I encourage you to try a version of it with your students.

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