

Commentary

Inclusion of LGBTQ+ Topics in Forensic Science Education

The Crime Scene Investigation (CSI) effect is often deemed as a negative byproduct of the cultural obsession of forensic science in media. However, thanks to the CSI effect, there is anecdotal evidence that there is an increased interest by students in forensic sciences (1). Using the Forensic Sciences to intrigue students in STEM fields is not unheard of as it has been used as a topic of interest in grade school summer camps, elective classes in high schools in addition to advertising tools in biotechnology programs at technical/vocational high schools. Even degree programs at the undergraduate and graduate level have been increasing in number as more student's express interest in these programs. Even when not selected as a major, many colleges now offer forensic science courses to non-majors as a science elective. Even in my introductory forensic science course designed for majors, non-majors elect to take the course out of general interest in the topic. While there is no doubt the forensic sciences have been useful as an arbiter of STEM education, forensic science education provides a unique opportunity to serve as a platform to underscore the importance of diversity, inclusion, and belonging on multiple fronts.

With increasing momentum, 47 US states have passed legislation in grade school and/or higher education which limits the ability to discuss topics of diversity and inclusion at public schools that are less palatable to people holding particular ideology with a specific focus on people of color and the LGBTQ+ community. For example, Florida has been under close scrutiny after passing the Parental Rights in Education Bill (HB 1557) (2) which has been called the "Don't Say Gay" bill for its clear restriction on LGBTQ+ topics in between kindergarten and third grade in 2022. In just one year, the Florida government has taken this legislation a step further, through Bill 1069 which increases these restrictions up to eight grade while adding the requirement that schools teach students that trans individuals cannot exist because sex is "binary and unchangeable" (3). This legislation and others like it will no doubt continue to marginalize groups students and faculty may be part of. For this reason, it is increasingly important to continue discussions on how to include these topics whenever possible and relevant to prevent further marginalization of students/faculty in higher education. While there are many aspects of diversity, equity, and inclusion (DEI) that *must* be discussed; for the purpose of brevity and personal experience, I will focus on the LGBTQ+ community in this commentary. However, there

needs to be more conversations in DEI across minority groups in Forensic Science and other STEM fields.

The LGBTQ+ community has seen a long history of violence and aggression. Though with this violence comes solidarity, courage, and perseverance from those that have been targeted and their allies. **Pride Month** (June) is a celebration of minority **sexual** and **gender identities** in remembrance of the Stonewall riots of 1969 and has turned into a celebration of living as one's authentic self as well as a continued movement for **queer** rights (4). Pride Month, while the most well-known and popular holiday, is not the only time of celebration and remembrance; with days and weeks dedicated to groups within the LGBTQ+ throughout the year. For example, LGBTQIA+ in STEM Day is observed November 18th every year by queer individuals and could be appropriately celebrated in our STEM classrooms or Departments during the academic year.

Globally, 83% of queer people within the general population do not disclose their identities, making up what has been coined the "global closet" (5). In the United States, one may assume that the number of people making up this percent is exceptionally low considering that gay marriage was made a federally protected right in 2015, and much of the American public agrees with this right. However, work still needs to be done to ensure that queer individuals feel safe enough to be open about their identities in public spaces. Currently, it is estimated that more than 40% of queer scientists do not disclose their identity to colleagues due to feeling uncomfortable, unsafe, or fear job loss (6). These concerns are not unfounded as 16% of queer physicists indicated that they had directly been harassed on the basis of their identity, with another 30% indicating that they had witnessed others being harassed for their identity within laboratory and academic spaces (7). This impact can be seen in student retention in STEM departments at academic institutions. It is estimated that 37% of self-identified queer students in STEM fields leave their program before graduation from four year institutions, 7% lower than their cisgendered heterosexual peers with both gender and sexual minority status being significant predictors of retention (8). Many factors influence the comfort of our queer students, including explicit harassment (9), and microaggressions (10). Microaggressions may be indicative of lack of knowledge, rather than explicit prejudice. Just shy of 60% of respondents in a survey on queer physicist in the workspace felt that comments made by colleagues indicated lack of knowledge surrounding the queer community which played a part in the concealment in some respondents identities (7). These statistics are not expected by the queer community to improve. In the past year alone, the American Civil Liberties Union (ACLU) has identified just under 500

active anti queer bills, spanning limitations on civil rights, restriction on free speech, and education (see the active legislation map here (11).

While much of faculty control exists within the department, satisfaction of our students is of interest at the institutional level as well. Queer students generally have a more negative view of campus climate and are more likely to withdraw from an institution in comparison to their straight and cis-gendered peers (12). Campus outlook can be exacerbated in students with intersecting identities, especially queer students of color (13). Unsurprisingly, perception of campus climate was directly correlated with academic success of queer students (14), underscoring the need for a multifaceted approach to DEI initiatives that extend to our queer students inside and outside the classrooms and department. With the Center for Disease Control (CDC) estimating that one in four high school students identify with the LGBTQ+ community (15), the statistics discussed are of growing concern for student satisfaction and retention within science departments and academic institutions. Especially since individuals who identify as LGBTQ+ are at increased risk of being a victim of a hate crime (16), and do not always have a familial support group to turn to in time of need unlike other disparaged groups (17).

Students who feel as though they identify with their professor on a personal level have higher perceived satisfaction and are likely to perform better in class (18). Thus, simply increasing the LGBTQ+ faculty (and networking) pool is a straightforward solution (18). In fact, this diversity may already be hidden in plain sight, as discussed earlier. Though it is important to note; the burden of change on the shoulders of any disenfranchised group is unjust and is inhibited by workplace perception of inclusion and safety, which is often controlled by the sexual/gender majority (19). In instances of invisible diversity within a (perceived or real) hostile environment, it can be favorable for an individual to not disclose their identity in certain situations, leading to the statistics discussed earlier. Thus, the path to inclusion is at a systemic, cultural level. Once faculty feel safe to be **out**, students can then feel safe to do so as well and can increase student retention (20). Therefore, all faculty, staff, and administrators need to make a concerted effort to learn about gender, romantic, and sexual identities to better understand their students/faculty and meet them where they are for support and guidance. Something as simple as discussing queer topics within classrooms in a relevant and respectful way can be a positive influence on inclusion efforts.

Generally introductory forensic science courses are survey courses, discussing the basic science that governs each specialty. I argue that because forensic science is tightly linked with the justice system and the human condition, it is an ideal platform to educate our students

about a variety of DEI topics. Below are forensic science fields that can be used to integrate a conversation about queer topics in the classroom. It is important to appropriately address these topics, the instructor must have sufficient knowledge to not promote misinformation on the topic. Especially with the understanding that there may be students self-discovering or have not publicly disclosed their identity participating in the discussion. Therefore, it is the job of the instructor to keep the conversation respectful and void of harmful language regardless of the topic. Below are a couple of examples in which relevant queer topics can be discussed in the forensic science classroom.

Jurisprudence. Introduction to law is integral to a forensic science curriculum, after all, that is what makes us unique from the other sciences. Forensic science students are often exposed to various biases that they may need to combat to better serve the justice system as scientific experts. The LGBTQ+ community faces implicit and explicit bias throughout the legal system, with those of intersecting personalities at greater risk (21). Several notes have highlighted the injustices that LGBTQ+ individuals face in every role within the justice system (22, 23, 24). For example, Charles Rhines was convicted in South Dakota of murder Donnivan Schaefer. Jurors argued that Rhines, a gay man, would enjoy a lifetime prison sentence and was sentence to death. Despite appeals with clear and admitted homophobia among the jury influencing his sentencing, the U.S. Supreme Court denied reviewing the case and Rhines was executed Nov. 4th, 2019 (24, 25). Students should be encouraged to read passages from these notes and be given question prompts to facilitate a class discussion on the implication these injuries have on expert witnesses. However, caution should be taken: the goal of this exercise is to discuss injustice, though it can easily scare a student from disclosing their identity publicly (i.e. on social media) in fear of how this may impact them if they later serve as an expert witness as part of their career. Therefore, as a facilitator, the instructor should lead students to discuss solutions to the current problem that can be done as a forensic scientist.

Handwriting. Often when discussing forensic handwriting analysis, I specify that graphology, or the study of handwriting to determine personality, emotion, and other traits, is pseudoscience based off harmful stereotypes and not the job of a forensic handwriting/document examiner. While it is easy to stop there, it can be impactful for students to see how harmful the belief that graphology is a legitimate science, especially for minority groups (26). For example, graphologists report the ability to determine gender through written works (27, 28) based on harmful stereotyping of handwriting style between what is perceived masculinity and femininity. Even in the event of dissenting opinion on the ability to determine

someone's gender, harmful assumptions of sexuality are presented for the purpose of proving their stance. For example, a textbook on handwriting analysis stated that "Sexual orientation is an entirely different ball of wax. The actor Rock Hudson, for instance, was quite masculine, but at the same time he was homosexual." (29). Inferring that gay men are classically feminine, and therefore Rock Hudson was a mere exception to the rule rather than representative of the diversity of gay and bisexual men and **gender expression**. He further emphasizes this mischaracterization later in the text when providing a case study of Ernest Hemmingway's writing "One would guess that part of Hemmingway's suicidal nature was linked to sadistic repression of homosexual or bisexual tendencies. He tried to foster the macho image, but to some extent it was a ruse against strong identification with a feminine archetype." (29). Faculty can utilize these faulty assertions to discuss **heteronormativity** and gender stereotypes in addition to dispelling misconceptions surrounding the role of forensic document examiners.

DNA. Forensic DNA can be used to not only understand the forensic importance of understanding that DNA databases have distinct limitations, such as determination of an individual's physical characteristics. When discussing DNA fingerprinting, the FBI's 22 identified loci for identification is often the topic of discussion. Along with a DNA profile, comes the AMEL locus, which is along the 23rd pair of chromosomes. Up to this point, students typically assume XY chromosomes are biologically male, and XX chromosomes are biologically female. After introducing DNA fingerprinting, I show a single DNA profile harboring an XY genotype and ask students if and what they can determine from this sample without an exemplar to compare to. Students undoubtedly say that they can and that the individual is male. The students are then told that the person is in fact a cisgendered female and ask the students how that could be. Following a brief discussion, I reveal that the sample is an example of DNA chimerism (discussed in more detail (30, 31). The topic of contradictions with the AMEL locus and sex is a useful segway into what is **legal** and **biological sex**, especially to those who are **intersex**, **transgender**, **genderqueer**, or have chromosomal differences (32). Students should conclude that DNA fingerprinting should be used as a way to compare unknown and known DNA samples, not arbitrarily create an individual's profile on the bases of chromosomal status.

Anthropology. Being the study of the human condition, this topic is ideal when discussing queer topics. Forensic Anthropology sets the foundation for an open discussion on the differences in sex and gender, race and ancestry, as well as cultural variation that needs to be taken into consideration in osteological reports. One topic that has been gaining more traction in the field is the

inclusiveness of trans and non-binary individuals in osteological reports (33). Especially since there is now believed to be a biological basis for gender (34), challenging the thought that gender was solely a social construct (which is often weaponized against trans and non-binary individuals as a way to write off gender as a belief system rather than fact). Through a facilitated discussion, students can grasp the challenge that forensic anthropologists face when needing to write these reports with the consideration that sex and ancestry may not reflect the individual's gender or race.

Forensic Nursing. In 2022 Forensic Nursing was recognized as the 12th section of the American Academy of Forensic Sciences (AAFS) and as such should be included when discussing introductory forensic science curriculum. Forensic Nurses in the criminal justice system (as prison nurses) and as Sexual Assault Nurse Examiners (SANE) serve as medical personnel who care for both perpetrators and victims of crimes, exemplifying the need for humanization of all people. The topic of forensic nursing allows for open discussion of access to health care in prison systems, including gender affirming care and the medical needs of trans and gender nonconforming individuals. The topic also allows for discussion of queer sexual victimization in prison systems by other inmates and prison staff, which is over five times more likely to occur with queer inmates (35). In recent years, there have been several publications discussing case studies and methodologies to consider queer individuals in practice to provide the best care possible for gender and sexual minority patients (36), which can serve as a guide to include this language into a forensic science classroom.

In conclusion, the integration of queer topics can provide an inclusive environment for students within the community, which can improve student experience and academic performance. Inclusion of queer topics can also provide the necessary information for non-queer students to better understand their queer peers and provide the tools to create a more inclusive atmosphere in our classes, departments, academic institutions, and larger communities. As Pride Month comes and goes each year, I hope that we as educators can reflect on ways to incorporate queer topics into our forensic science courses year-round and support queer faculty to feel safe in their places of work to serve as a role model for our queer students.

Glossary

DEI: Diversity, Equity, and Inclusion. initiatives to allow for individuals of underrepresented groups to feel a sense of belonging and empowerment to participate fully in the community.

LGBTQ+: Lesbian, Gay, Bisexual, Transgender, Queer or Questioning, and other related sexual/gender minorities

Pride Month: A celebration throughout the month of June to commemorate the Stonewall Riots of 1969 and celebrate queer rights and culture. The Stonewall Riots were a series of protests for gay rights following a police raid of the Stonewall Inn, a gay bar in New York City. The first pride march took place one year later (1970) and is now commemorated with Pride Parades found throughout the United States and other Countries.

Sexual Identity: A person's romantic and/or sexual attractions to individuals of the same and/or other genders or sexes.

Gender Identity: A person's feeling of gender regardless of their sex at birth (see cisgendered and genderqueer below).

Queer: Umbrella term for an individual of the LGBTQ+ community. While once a derogatory term used against the community, the term (among other derogatory terms) have been reclaimed by the community to devalue the term as harmful.

Out: To be public about one's sexual or gender identity. This can present in various degrees. For example, someone can be out to a friend, but not to their family. The degree to which someone is public about their orientation is based on perceived safety in doing so.

Gender Expression: A person's appearance, behavior, personality, etc. that is perceived to be masculine or feminine.

Heteronormativity: The world view that heterosexuality is the standard condition, with variation in sexual or gender orientation being considered outside of the expected human condition.

Cisgendered: A person whose gender identifies as the sex they were assigned at birth.

Legal Sex: Sex as identified on legal documents. Legal sex can be changed depending on where the individual lives in the United States though not all states will grant this change and others require gender confirming surgery to do so. Legal sex in several states are being challenged in 2023 via bills. For example, North Dakota passed House Bill 1297, making it impossible for someone to change the sex on their birth records (37).

Biological Sex: Sex assigned at birth and identified as biological male, biological female, and intersex.

Intersex: An individual possessing male and female reproductive anatomy or chromosomes.

Transgender: An individual who identifies as the gender opposite to their biological sex and conforms to the gender norms of the opposite sex. While many undergo gender confirming surgeries, this is not always the case.

Genderqueer: An umbrella term for gender non-conforming identities. Commonly used terms is also non-binary

LGBTQ+ in STEM Resources for Faculty and Students

PrideinSTEM.org
TheSTEMVillage.com
QueerSTEM.org
oSTEM.org
LGBTSTEM.wordpress.com

Acknowledgements

I want to thank the two anonymous reviewers who took the time to provide feedback which improved the quality of this manuscript.

I also want to thank my close friends who encouraged me to submit this commentary. I wrote the first draft of this manuscript at the time HB 1557 was passed and at the time I was living in Florida. I hesitated to submit the manuscript for review due to my own fear of negative backlash in my professional and personal life. They reminded me that is the very reason why this commentary needed to be published.

Signature line with Author name Samantha J. Sawyer¹
¹*Department of Science and Mathematics, Curry College, 1071 Blue Hill Avenue, Milton, MA 02186, samantha.sawyer@curry.edu*

References

1. Slak B, Erčulj VI, Areh I, Dobovšek B. Do Fictional Forensic and Criminal Investigation Television Shows Influence Students' Enrollment Decisions? *J Crim Justice Educ* 2020;31:23–42. <https://doi.org/10.1080/10511253.2019.1651357>.
2. House Bill 1557 (2022) - The Florida Senate n.d. <https://www.flsenate.gov/Session/Bill/2022/1557> (accessed September 11, 2023).
3. House Bill 1069 (2023) - The Florida Senate n.d. <https://www.flsenate.gov/Session/Bill/2023/1069/ByVersion> (accessed September 11, 2023).
4. Stein M. *The stonewall riots: A documentary history*. NYU Press; 2019.
5. Pachankis JE, Bränström R. How many sexual minorities are hidden? Projecting the size of the global closet with implications for policy and public health. *PLOS ONE* 2019;14:e0218084. <https://doi.org/10.1371/journal.pone.0218084>.

6. Leman J. What's It Like to Be Queer in STEM? *Sci Am Blog Netw* 2022. <https://blogs.scientificamerican.com/voices/whats-it-like-to-be-queer-in-stem/> (accessed April 1, 2022).
7. Dyer J, Townsend A, Kanani S, Matthews P, Palermo A. Exploring the workplace for LGBT+ physical scientists. *Inst Phys R Astron Soc R Soc Chem* 2019.
8. Hughes BE. Coming out in STEM: Factors affecting retention of sexual minority STEM students. *Sci Adv* 2022;4:eaa06373. <https://doi.org/10.1126/sciadv.aao6373>.
9. Miller RA, Vaccaro A, Kimball EW, Forester R. "It's dude culture": Students with minoritized identities of sexuality and/or gender navigating STEM majors. *J Divers High Educ* 2021;14:340.
10. Fitzgerald-Russell ML, Kowalske MG. Microaggression experiences of queer science students in their departments. *J Res Sci Math Technol Educ* 2022;5:131–53.
11. Mapping attacks on LGBTQ rights in U.S. state legislatures. *Am Civ Lib Union* n.d. <https://www.aclu.org/legislative-attacks-on-lgbtq-rights> (accessed June 19, 2023).
12. Garvey JC, Rankin SR. Making the grade? Classroom climate for LGBTQ students across gender conformity. *J Stud Aff Res Pract* 2015;52:190–203. <https://doi.org/10.1080/19496591.2015.1019764>.
13. Sadika B, Wiebe E, Morrison MA, Morrison TG. Intersectional microaggressions and social support for LGBTQ persons of color: A systematic review of the Canadian-based empirical literature. *J GLBT Fam Stud* 2020;16:111–47.
14. Garvey JC, Squire DD, Stachler B, Rankin S. The impact of campus climate on queer-spectrum student academic success. *J LGBT Youth* 2018;15:89–105.
15. Centers for Disease Control and Prevention MMWR. Youth Risk Behavior Surveillance — United States, 2021 2023;72.
16. Flores AR, Stotzer RL, Meyer IH, Langton LL. Hate crimes against LGBT people: National crime victimization survey, 2017-2019. *PLoS One* 2022;17:e0279363.
17. Robinson BA. Conditional families and lesbian, gay, bisexual, transgender, and queer youth homelessness: Gender, sexuality, family instability, and rejection. *J Marriage Fam* 2018;80:383–96.
18. Linley JL, Nguyen D, Brazelton GB, Becker B, Renn K, Woodford M. Faculty as sources of support for LGBTQ college students. *Coll Teach* 2016;64:55–63.
19. Schilt K, Meadow T. Introduction: Queer work in a straight discipline. *Please Specify*, University of California Press; 2018, p. 1–34.
20. Patridge EV, Barthelemy R, Rankin SR. Factors impacting the academic climate for LGBTQ STEM faculty. *J Women Minor Sci Eng* 2014;20.
21. Mogul JL, Ritchie AJ, Whitlock K. *Queer (In)Justice: The Criminalization of LGBT People in the United States*. Beacon Press; 2011.
22. Ries BV. Not Up For Deliberation: Expanding the Peña-Rodriguez protection to cover jury bias against LGBTQ+ individuals. *Duke Law J* 2023;72:1567–603.
23. Woods JB. LGBTQ in the courtroom. *Crim Juries 21st Century Psychol Sci Law* 2018;61.
24. Skinner S. Don't Be Blindsided by LGBTQ Bias: Preexisting attitudes and beliefs about LGBTQ people can harm your client's case-so you need to address these issues head-on. *Trial* 2021;57:50–4.
25. How a Gay Man's Execution Forced An Examination Of Anti-LGBTQ Bias Among Juries. *Oxyg Off Site* 2022. <https://www.oxygen.com/crime-news/charles-rhines-executed-jury-alleged-anti-lgbtq-bias> (accessed September 24, 2023).
26. Moore M. On the failures of graphology n.d.
27. Ahmed M, Rasool AG, Afzal H, Siddiqi I. Improving handwriting based gender classification using

- ensemble classifiers. *Expert Syst Appl* 2017;85:158–68.
28. Topaloglu M, Ekmekci S. Gender detection and identifying one's handwriting with handwriting analysis. *Expert Syst Appl* 2017;79:236–43.
29. Seifer M. *The Definitive Book of Handwriting Analysis: The Complete Guide to Interpreting Personalities, Detecting Forgeries, and Revealing Brain Activity Through the Science of Graphology*. Red Wheel/Weiser; 2008.
30. Alsaleh AB, Alokail MS, Kassab ACh, Chaudhary AR, Messaoudi SA, Babu SR, et al. The impact of chimerism on DNA-based human identification from skin surface cells of post-allogenic hematopoietic stem cell transplantation (HCST) patients. *Forensic Sci Int* 2021;318:110636. <https://doi.org/10.1016/j.forsciint.2020.110636>.
31. Lo YD. Fetal DNA in maternal plasma: biology and diagnostic applications. *Clin Chem* 2000;46:1903–6.
32. von Wurmb-Schwark N, Bosinski H, Ritz-Timme S. What do the X and Y chromosomes tell us about sex and gender in forensic case analysis? *J Forensic Leg Med* 2007;14:27–30.
33. Tallman SD, Kincer CD, Plemons ED. Centering transgender individuals in forensic anthropology and expanding binary sex estimation in casework and research. *Forensic Anthropol* 2021;5:161–80.
34. Ristori J, Cocchetti C, Romani A, Mazzoli F, Vignozzi L, Maggi M, et al. Brain sex differences related to gender identity development: genes or hormones? *Int J Mol Sci* 2020;21:2123.
35. Sexual Victimization in Prisons and Jails Reported by Inmates, 2011-12. *Off Justice Programs* n.d. <https://www.ojp.gov/library/publications/sexual-victimization-prisons-and-jails-reported-inmates-2011-12> (accessed June 26, 2023).
36. Dickerson S. *Nursing Care for Transgender and Nonbinary Patients An Educational Model for Forensic Nurse Examiners* 2022.
37. HB 1297 - Overview | North Dakota Legislative Branch n.d. <https://ndlegis.gov/assembly/68-2023/regular/bill-overview/bo1297.html> (accessed September 12, 2023).