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**NATIONAL SOCIAL SCIENCE TECHNOLOGY JOURNAL**

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# Teacher Candidates' Perception of Virtual Field Experience During the Pandemic

by

Ruth Boyd, Allen Boyd & Reggy Yount

School of Education Marymount University

Department of Education, Southwestern Oklahoma State University

**Abstract**

Institutions offering teacher preparation degree programs recognize the positive impact of field experiences on prospective teachers. These experiences allow teacher candidates to apply university-classroom theory to actual practice and meet national accreditation requirements established by the Council for Accreditation of Teacher Education Programs (CAEP). CAEP Standard 2: Clinical Partnerships and Practice (2022) calls for institutions to develop effective partnerships with P-12 schools to offer clinical experiences for teacher candidates. In the past, these experiences were typically face-to-face interactions, as cooperating teachers opened their classroom doors to teacher candidates. The COVID-19 pandemic changed this context for many university/P12 partnerships, as restrictions were implemented to reduce virus transmission and community spread. However, the field experience requirements remained integral to teacher preparation programs. This study examines one model implemented by an institution for higher education and teacher candidates' perception of its efficacy.

**Conceptual Framework**

Many contemporary teacher preparation programs, including the institution at which this study was conducted, base their conceptual frameworks upon the work of Horace Mann and Lev Vygotsky. Mann, considered the most influential American education reformer of the 19th century, was convinced that teaching was the most challenging of the arts. He wrote extensively about pedagogical expertise – *the art of teaching* – and called for only well-trained, professional teachers to be in classrooms (Baines, 2006; Hunt et al., 2010). Mann stressed the importance of experiential education, particularly those experiences in which a partnership was developed between student and community to maximize stability and learning support (Hunt et al., 2010). Vygotsky's later work, the Sociocultural Theory of Cognitive Development, complements the work of Mann, as Vygotsky suggested learning from social interactions between individuals and society (McLeod, 2020).

As an extension of these philosophies, accrediting bodies, such as the Council for the Accreditation of Educator Preparation (2022), have identified field experience as an important component of teacher-candidate instruction. Practitioners agree. In a recent review of educational research, Nagro and deBettencourt (2017) found that 78% of publications they reviewed concluded that teacher candidates benefited from field experiences conducted in school-based settings because these experiences best-prepared teacher candidates for the complexity of the classroom. Simply put, field experiences allow future teachers to apply their classroom knowledge to authentic classroom experiences. Figure 1 is a graphic representation of this institution's conceptual framework for teacher preparation, consisting of four essential components:

1) exemplary university classroom experiences; 2) teacher education cohort experiences; 3) education-related service-learning experiences, and 4) best practices field experiences. This study focused on the field experiences offered during one semester of the COVID-19 pandemic and asked the question: *What were teacher candidates' perceptions of the virtual field experience in relation to meeting course student learner outcomes?*

*Figure 1. Conceptual Framework*


(Southwestern Oklahoma State University, 2019)

**Literature Review**

Field experiences are an integral component of teacher preparation programs and the mentoring of teacher candidates. This element of teacher education provides teacher candidates with the opportunity to apply theory learned in the university classroom to actual practice in the field, increasing their ability to understand social and cultural contexts and the varied needs of diverse students (Shelton et al., 2020). Ideally, teacher preparation programs intentionally provide teacher candidates with multiple field experiences throughout their academic programs, culminating in the student teaching practicum. This practice scaffolds the conceptual framework philosophy of Horace Mann with Vygotsky's sociocultural theory of learning, the process by which individuals construct learning through processes of experience (Sharp et al., 2019).

**Field Experience Assessment**

Teacher preparation research is often couched in the philosophy of research as a social practice, focusing on teacher candidate accountability and effectiveness (Cochran-Smith & Villegas, 2015). To that end, this study was conducted in the introductory Education course for undergraduate teacher candidates. This course is required for all secondary content majors, all P-12 certification areas (art, music, physical education, and special education), and all elementary and early childhood majors. Teacher candidates' first field experience is embedded in the course curriculum so that they have the opportunity to reflect upon "professional and pedagogical knowledge [and] skills as well as dispositions" under the supervision of university faculty members (Singh, 2017, p. 179). Specifically, the student learner outcomes for the field experience component are aligned with three of the Interstate Teacher Assessment and Support Consortium (InTASC) Core Teaching Standards, published by the Council of Chief State School Officers (2011):

Standard 2 - Learning Differences: The teacher uses an understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.

Standard 3 - Learning Environments: The teacher works with others to create environments that support individual and collaborative learning and encourage positive social interaction, active engagement in education, and self-motivation.

Standard 8 – Instructional Strategies: The teacher understands and uses a variety of instructional strategies to encourage learners to develop a deep understanding of content areas and their connections and to build skills to apply knowledge in meaningful ways.

Upon completion of the field experience, teacher candidates complete and submit a reflective log, providing written responses to prompts aligned with these designated In TASC standards as a means to demonstrate proficiency. The course instructor evaluates this log as part of the final course grade, but perhaps more importantly, as a requirement to progress further in the academic program.

**Innovative Practices**

Before the COVID-19 pandemic, field experiences at this institution were conducted in a traditional face-to-face format, with teacher candidates hosted by P-12 community partner schools. Due to ongoing restrictions and the uncertainty of the community's virus spread, institutions inevitably found creative solutions so that candidates could continue progressing with program requirements. The solution came in the form of virtual field experiences. As education philosopher John Dewey once stated, "the educational process is continual reorganizing, reconstructing, and transforming (as cited by Holt, 2021, p. 9). This institution, as did many of its counterparts, chose to view this challenge through a positive lens. If program goals include preparing teacher candidates to exhibit professional dispositions such as problem-solving and flexibility, then an innovative way to offer field experiences is appropriate (Holt, 2021). As with any clinical experience, success relies on effective collaboration between university faculty and the cooperating teachers who invite teacher candidates into their classrooms (Singh, 2017). In the context of this case study, one public school partner, a suburban P-12 district serving approximately 8,000 students, opened its virtual doors to teacher candidates by supplying online Uniform Resource Locator (URL) links to access classroom cameras so that that teacher candidates could observe real-time instruction and student engagement in multiple classroom settings.

**Methods**

The teacher candidates, enrolled in numerous sections of the introductory Education course and completing the required virtual field experience hours, were considered a bounded system for this case study. Case study data collection was conducted as a form of survey research, a nonexperimental method that relies on questionnaires for data collection (Johnson & Christensen, 2020). The survey questions were constructed to align with the course's three InTASC standards identified as student-learner outcomes. Teacher candidates were asked to complete the ten-question survey as a culminating course activity upon completing the required number of virtual field experience hours.

The survey was administered via the university's Canvas Learning Management System. Questions were open-ended, and the teacher candidates supplied answers. Data were coded, and thematic analysis was used to note important ideas that occurred multiple times in teacher candidates' responses (Johnson & Christensen, 2020).

**Results**

This study aimed to explore teacher candidates' perception of their virtual field experience related to mastery of InTASC standards. In the analysis of survey responses, three main themes were identified:

1. Acquisition of Classroom Management Techniques
2. Observation of Multiple Teaching Strategies
3. Recognition of Multiple-Modality Teaching Styles

Most respondents (73%) reported the acquisition of classroom management techniques. This topic is covered extensively in the university-lecture portion of the course and is aligned with InTASC Standard 3: Learning Environments. This is also an area in which many teacher candidates express concern about their self-efficacy. Prior to the field experience, university-classroom discussions often revealed statements dealing with time management, student engagement and noise level, seating arrangements, and teacher organization, all components of classroom management. Upon completion of the field experience, provide statements such as:

- I learned new "call back" techniques to get students' attention.
- I enjoyed seeing how different classrooms were set up.
- The teacher I observed demonstrated lots of positive reinforcement techniques.

A large portion of respondents (63%) noted their observance of expert teaching strategies, an outcome aligned with InTASC Standard 8: Instructional Strategies. Prior university-classroom discussions had focused on instructional strategies experienced by teacher candidates while they were P-12 students and their perceptions of former teachers. The concept of scaffolding, the building of connections to increase student learning, has also been introduced. After the field experience, teacher candidates commented:

- One day, I saw how an elementary student was not connecting the lesson from the day before. The teacher took the time to help him make the connection.
- My cooperating teacher was very creative, and the student did different daily activities.
- It was beneficial to see different strategies in action.

The final theme that emerged, the observation of multiple teaching styles (modalities), was expressed by 34% of respondents. Aligned with InTASC Standard 2: Learning Differences, teacher candidates had expressed particular interest in seeing this in action. After the field experience concluded, they stated:

- I now understand the importance of differentiated instruction.
- I'm excited to continue to expand my knowledge of differentiated instruction.
- This observation gave me a better perspective of how different children learn.

**Discussion**

Based on study results, the institution's faculty members were pleased with teacher candidates' ability to adapt to a problematic situation associated with the global pandemic. Although they could not participate in face-to-face classroom observations, teacher candidates completed their required number of virtual field experience hours. In doing so, they exhibited a mastery of the necessary technology and professional dispositions (flexibility) cited as needed by classroom teachers (Holt, 2021). Faculty members were further encouraged by the positive comments made by teacher candidates during university lectures and conversations with cooperating teachers at the partner school. An unexpected comment expressed by multiple teacher candidates was that the virtual nature of the field experience enabled them to observe multiple classrooms and multiple grade levels more efficiently throughout the semester. The collaborative effort needed to ensure the acquisition of field experience hours has strengthened the partnership between the university and its community partner, an important component of the teacher preparation process (Singh, 2017). As a result, university faculty members are confident that, to the best of their ability, they were able to provide an initial field experience that met established course objectives. A review of the reflective logs submitted by teacher candidates to their university professors indicated grades comparable to prior semesters in which field experiences were conducted face-to-face. This further validated faculty members' evaluation of the virtual field experience component in the overall success of the course.

## Conclusion

Although they had no prior field experiences within their academic program, the teacher candidates in this case study responded well to the virtual requirements of a COVID-19 semester. University faculty members and their P-12 colleagues successfully implemented a field experience that, while unconventional prior to the pandemic, successfully met student-learner outcomes. The willingness to grow professional dispositions of collaborative and flexible interactions will continue to benefit teacher candidates, P-12 partners, and university faculty.

## Limitations and Implications for Future Research

Although this study was approached with intentionality, it has certain limitations. This was the first semester in which initial field experiences were completed virtually. If this virtual option is to be offered in the future, the institution should be mindful of teacher candidates' suggestions for improvement. These notations included improved technology, such as better camera angles and consistent Zoom URL links. Teacher candidates also indicated that they would have liked more time per observation session rather than be limited to 50-minute sessions. They also requested that all content areas be represented, as no Music or Art classes were available for observation during this study. Perhaps the most important point raised by teacher candidates was the inability to interact with the class rather than simply observe the cooperating teacher and students. This component is integral to offering an experience more closely aligned with the study's conceptual framework and the course's objectives.

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**Technology in Teacher Education: Do Teacher Educators Model Effective Practices?**

Kathleen Wagner, Eastern New Mexico University

Mark Viner, Eastern New Mexico University

## Abstract

Teacher educators must model the effective use of technology in the classroom. This study investigates how educators at a rural, regional, Hispanic-serving institution in the Southwest use technology throughout two teacher education programs. Teacher educators in the secondary education and elementary and special education blended programs revealed how technology was used to promote learning. The Teacher Educator's Technology Competencies (TETCs) were used as an assessment tool to capture data. Teacher educators were asked to use the assessment tool to analyze their courses, individual assignments, and activities related to the TETCs. The data collected were compiled into this report. Results provide a foundation for program improvement and initiatives for professional development for teacher educators.

**Keywords***:* technology, teacher candidates, teacher educators, pedagogy, teacher education program

## Introduction

Over the past years, teaching has become more challenging regarding pedagogical tools available to meet the needs of diverse learners, especially with technology. Teachers in prekindergarten through twelfth-grade classrooms are expected to design activities that use technology effectively to engage learners in the curriculum (Kali et al., 2015). Teacher education program coursework provides the optimal environment to model the effective use of technology in the classroom (Liu, 2011). Therefore, teacher educators must model how to effectively use technology during the learning-teaching process in teacher education programs. A teacher candidate's prior experiences with technology integration impact their use of technology in the classroom (Khlaif, 2018). In addition, teacher candidates with a high self-efficacy in using technology are more apt to use technology in the classroom because they are confident in their skills (Coyne et al., 2017). One approach is explicit modeling. Explicit modeling occurs when teacher educators provide candidates with opportunities to experience how technology effectively supports the learning-teaching process. Although candidates are well-prepared to use technology in the classroom, they have limited pedagogical knowledge, necessitating teacher education programs to improve effective instruction in technological pedagogical content knowledge (Coyne et al., 2017).

The purpose of the study is to examine teacher educators' use of technology in teacher education programs (TEP) at a rural, regional, Hispanic-serving institution in the Southwest. Two teacher education programs are used in the study. The programs include the secondary education (SED) program and the blended elementary and special education (SPLED) program. This program analysis explores what types of technology teachers use and their perception of using technology in the TEP. The Teacher Educator Technology Competencies (TETCs) developed by Foulger, Graziano, Schmidt-Crawford, and Slykhuis (2017) are used to guide the investigation because they advocate for best practices in using technology in a teacher education program. The TETCs comprise twelve competencies (Table 1), each divided into subcategories.

The purpose of the competencies is to support the effective use of technology by teacher educators throughout teacher education programs.

**Table 1**
*Teacher Educators Technology Competencies (TETCs)*

| | |
|---|---|
| **1** | Teacher educators will design instruction that utilizes content-specific technologies to enhance teaching and learning. |
| **2** | Teacher educators will incorporate pedagogical approaches that prepare teacher candidates to use technology effectively. |
| **3** | Teacher educators will support the development of teacher candidates' knowledge, skills, and attitudes related to teaching with technology in their content area. |
| **4** | Teacher educators will use online tools to enhance teaching and learning. |
| **5** | Teacher educators will use technology to differentiate instruction to meet diverse learning needs. |
| **6** | Teacher educators will use appropriate technology tools for assessment. |
| **7** | Teacher educators will use effective strategies for teaching online and/or blended/hybrid learning environments. |
| **8** | Teacher educators will use technology to connect globally with a variety of regions and cultures. |
| **9** | Teacher educators will address technology's legal, ethical, and socially responsible use in education. |
| **10** | Teacher educators will engage in ongoing professional development and networking activities to improve the integration of technology into teaching |
| **11** | Teacher educators will engage in leadership and advocacy for using technology. |
| **12** | Teacher educators will incorporate pedagogical approaches that prepare teacher candidates to use technology effectively. |

**Literature Review**

Currently, the programs in this review include a standalone technology course focusing on technology integration in the classroom. This course has minimal collaboration with other courses in the education program designed to prepare our future educators for the classroom.  This standalone technology course aligns with the Interstate Teacher Assessment and Support Consortium (InTASC) and states Instructional Technology Competencies/Objectives.  The standalone course is typical of most college of education programs that prepare teacher candidates to use technology in the classroom for effective teaching and learning (Foulger et al., 2017; Gronseth et al., 2010; Oliver & Townsend, 2013). Furthermore, Oliver and Townsend (2013) point out that standalone courses often do not effectively assist preservice teachers in integrating technology into classroom practices.

Instefjord and Munthe (2016) reported on a research review of 19 teacher education programs.  They focused on three aspects of the technology integration program: technology proficiency, pedagogical compatibility, and social awareness. They found that less than 50% of preservice teachers did not feel prepared to teach with technology in the classroom. They indicated that teaching students how to use technology is not enough and that students are expected to integrate technology into the classroom in isolation. They state, "In other words, it becomes the student's responsibility to convert technology proficiency into pedagogical compatibility" (p. 90). They also suggest that technology integration should be authentic and useful to students. They claim it is more than basic skills; technology needs to incorporate pedagogical knowledge and provide strategies for content-specific courses in education.

Gronseth et al. (2010) concur and point out that for technology use to be effective, it should give authentic experiences "… technology integration curriculum should include ensuring that activities and content reflect the knowledge and skills used in the field" (p.34). In addition, they claim that education faculty deem it essential to include positive technology experiences in both methods and field experiences.

Wetzel, Buss, Foulger, and Lindsey (2014) offer several recommendations for changing faculty preparation programs. One is to implement an initial plan and stay the course. They point out that program initiatives take time and require changing faculty mindsets to prepare them to update their classroom activities and assignments. Second, faculty are at various skill levels with technology integration and may need individual assistance to develop the required skills in both technology usage and pedagogy knowledge. Lastly, they recommend that students be given a voice. In a literature review, Oliver and Townsend (2013) found that exemplary teacher education programs have faculty that create courses that share and collaborate on various technology standards. In short, these successful programs created a shared vision. The TETCs have the potential to be this vision or guide.

In an investigation by Foulger et al. (2017) on the TETCs, individuals reviewing the competencies suggested the new TETCs could be utilized as a self-assessment tool to guide effective practices for integrating technology throughout a teacher education program. In addition, they point out that with adequate support from the administration, the TETCs could be used as a framework to guide and develop an initiative to develop faculty skills and pedagogical knowledge related to effective teaching and learning with technology. As Foulger et al. (2017) stated, "The TETCs should be viewed as the first step in a greater reform effort to address technology integration in teacher education programs better" (p. 413).

**Methodology**

The qualitative case study explores how teacher educators use technology in their courses. Full-time faculty identified as teacher educators of the undergraduate secondary education (SED) program and the undergraduate blended elementary and special education (SPLED) program used the TETCs to determine their use of technology in the university classroom. *A Technology Integration: Course Analysis* (Appendix) was created using the TETCs. The assessment tool was emailed to all teacher educators in the Curriculum and Instruction and Educational Studies departments in the College of Education. If more than one faculty member taught a course, the document was sent to the lead instructor for that course. The purpose of this assessment tool was to survey and discover whether the programs and individual courses integrated technology into classroom activities and assignments and to what extent teacher educators meet the TETCs. Faculty used the chart to document the types of technology they used to meet each subcategory of each standard. The types of technology reported by faculty were coded according to the purpose. The resource was coded as information presentation if technology was used to present information digitally. The resource was coded as interactive if the technology required students to interact online.

Furthermore, a code was created to identify when communication between teacher/student and student/student was the purpose of the resource. This was the initial time most faculty became acquainted with the TETCs. Awareness of the competencies did not occur before the study, except for the instructor of C7, which is a standalone technology course.

The SPLED Program prepares teacher candidates for elementary and special education licensure. Elementary is identified as kindergarten through eighth grade, while the special education license allows candidates to work with students with special needs in kindergarten through twelfth grade. The SED program prepares candidates to teach students in seventh through twelfth grade. All courses evaluated in the study are held on the university campus in a face-to-face context. To provide anonymity of this study, the title of TEP courses has been coded as Course 1 (C1), Course 2 (C2), Course 3 (C3), etc. The coursework order coincides with the scope and sequence of each Program's curriculum. Courses 1 through 7 are included in both the SED and SPLED programs. Courses 8 through 13 are unique to the SPLED Program, and Courses 14 through 16 are unique to the SED program.

**Research Findings**

The data collected was used to assess technology use within the Program's scope and sequence. Several themes emerged from the data. A disparity between the upper-division coursework of the programs was discovered. Data also showed that technology is not being used to connect globally with a variety of regions and cultures. Data disclosed that technology is used more effectively in courses that include field experience in public school classrooms. Furthermore, data showed that not all faculty implement technology in the university classroom. Finally, using technology to present course content information was reported throughout both programs. The following discussion will provide further details on emergent themes that the data revealed about both programs.

**Upper-division Coursework Disparity**

The data collected from the assessment tool revealed evidence for meeting all TETCs. (Table 2 and Table 3). Faculty reported the use of technology to meet each competency to some degree. As noted in the following tables, TETC 1 and TETC 3 received 63% in the SED program, which was the highest. Faculty reported that they design instruction that utilizes content-specific technologies to enhance teaching and learning, and they support the development of teacher candidates' knowledge, skills, and attitudes related to teaching with technology in their content area, which is the focus of TETC 1 and TETC 3. Furthermore, TETC 4 received 69% in the SPLED Program, which indicates that faculty use online tools to enhance teaching and learning. While the data is the same for both programs for Course1 (C1) through Course 7 (C7), the survey revealed a disparity in the use of technology for upper-division coursework. Upper-division coursework for both programs met eight or more competencies or met three or fewer competencies. Upper-division coursework for the SED Program includes Course 14 (C14) through Course 16 (C16). The SPLED Program includes Course 8 (C8) through Course 13 (C13).

Course 15 (C15) instructor in the SED Program gave an account of meeting one competency. Three faculty in the SPLED Program described meeting three or fewer competencies. The instructors of Course 8 (C8) and Course 10 (C10) identified meeting three competencies, while the instructor of Course 11 (C11) met two. Furthermore, it is noted that if faculty identified meeting one or more of the subcategories of the competency, the course was credited as meeting that competency. Data showed a disparity between upper-division coursework using technology in the teacher education programs.

**Table 2**
*SED Program*

| TETC | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C14 | C15 | C16 | MET |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 33% | 100% | 100% | 33% | 100% | 0% | 100% | 100% | 0% | 66% | 63% |
| **2** | 25% | 25% | 75% | 50% | 25% | 0% | 100% | 75% | 0% | 50% | 43% |
| **3** | 33% | 100% | 100% | 66% | 33% | 0% | 100% | 100% | 33% | 66% | 63% |
| **4** | 25% | 0% | 100% | 100% | 75% | 25% | 100% | 100% | 0% | 75% | 60% |
| **5** | 25% | 75% | 50% | 50% | 0% | 0% | 100% | 50% | 0% | 75% | 43% |
| **6** | 0% | 0% | 100% | 66% | 33% | 33% | 100% | 100% | 0% | 33% | 47% |
| **7** | 0% | 0% | 100% | 100% | 50% | 0% | 100% | 0% | 0% | 100% | 45% |
| **8** | 33% | 0% | 0% | 66% | 33% | 0% | 33% | 0% | 0% | 33% | 20% |
| **9** | 33% | 66% | 0% | 0% | 66% | 0% | 100% | 0% | 0% | 33% | 30% |
| **10** | 0% | 0% | 100% | 66% | 0% | 0% | 100% | 100% | 0% | 33% | 40% |
| **11** | 0% | 60% | 80% | 0% | 20% | 20% | 60% | 80% | 0% | 60% | 38% |
| **12** | 0% | 66% | 100% | 66% | 0% | 0% | 66% | 100% | 0% | 33% | 43% |
| **TETC** | **C1** | **C2** | **C3** | **C4** | **C5** | **C6** | **C7** | **C14** | **C15** | **C16** | **MET** |
| **MET** | 7 | 7 | 10 | 10 | 9 | 3 | 12 | 9 | 1 | 12 | |

*Note.* The MET row equals the number of competencies met out of the 12 TETCs. Meeting the competency is identified as having data to support one or more subcategories.

**Table 3**
*SPLED Program*

| TETC | C1 | C2 | C3 | C4 | C5 | C6 | C7 | C8 | C9 | C10 | C11 | C12 | C13 | MET |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **1** | 33% | 100% | 100% | 33% | 100% | 0% | 100% | 0% | 66% | 0% | 0% | 100% | 100% | 56% |
| **2** | 25% | 25% | 75% | 50% | 25% | 0% | 100% | 0% | 75% | 0% | 25% | 75% | 100% | 44% |
| **3** | 33% | 100% | 100% | 66% | 33% | 0% | 100% | 0% | 100% | 0% | 0% | 33% | 66% | 48% |
| **4** | 25% | 0% | 100% | 100% | 75% | 25% | 100% | 50% | 100% | 50% | 100% | 100% | 75% | 69% |
| **5** | 25% | 75% | 50% | 50% | 0% | 0% | 100% | 0% | 50% | 0% | 0% | 0% | 50% | 30% |
| **6** | 0% | 0% | 100% | 66% | 33% | 33% | 100% | 33% | 100% | 33% | 0% | 100% | 33% | 48% |
| **7** | 0% | 0% | 100% | 100% | 50% | 0% | 100% | 0% | 100% | 0% | 0% | 50% | 50% | 42% |
| **8** | 33% | 0% | 0% | 66% | 33% | 0% | 33% | 0% | 0% | 0% | 0% | 33% | 0% | 15% |
| **9** | 33% | 66% | 0% | 0% | 66% | 0% | 100% | 0% | 0% | 0% | 0% | 0% | 0% | 21% |
| **10** | 0% | 0% | 100% | 66% | 0% | 0% | 100% | 0% | 0% | 0% | 0% | 100% | 33% | 30% |
| **11** | 0% | 60% | 80% | 0% | 20% | 20% | 60% | 0% | 0% | 0% | 0% | 20% | 0% | 30% |
| **12** | 0% | 66% | 100% | 66% | 0% | 0% | 66% | 66% | 100% | 66% | 0% | 0% | 33% | 43% |
| **MET** | 7 | 7 | 10 | 10 | 9 | 3 | 12 | 3 | 8 | 3 | 2 | 9 | 9 | |

*Note.* The met row equals the number of competencies met out of the 12 TETCs. Meeting the competency is identified as having data to support one or more subcategories.

## Lack of Global Connection

The competency that scored the lowest in both programs was *Competency 8: Teacher educators will use technology to connect globally with a variety of regions and cultures.* 20% of the courses in the SED program met this competency, and only 15% of the SPLED program courses met it. The data showed that global and cultural connections with technology were lacking or non-existent for most faculty members. One faculty met 66%; however, this is a standalone technology course for both programs. Only four other faculty reported meeting the competency at 33%. Eleven of the sixteen courses surveyed did not meet the competency which promotes global connection.

**Courses with Field Experience Requirement**

Eight courses in the study include field experience in public school classrooms. The faculty reported meeting more competencies than courses without field experience, except for Course 15 (C15). Data in Table 4 denotes the number of competencies met by the eight courses requiring field experience. Field experience is a placement in a public school classroom arranged by the Teacher Education Office (TEO) with public school partners. All but one of the courses with a field experience requirement scored 67% or above.

**Table 4**
*Field Experience Courses*

| Course | Number of TETCs | Percentage Met | Program |
|---|---|---|---|
| 3 | 10 | 83% | SED and SPLED |
| 5 | 9 | 75% | |
| 9 | 8 | 67% | SPLED |
| 12 | 9 | 75% | |
| 13 | 9 | 75% | |
| 14 | 9 | 75% | SED |
| 15 | 1 | 8% | |
| 16 | 12 | 100% | |
| **Total: 8** | **Total: 67** | **Total Ave.: 70%** | |

Course 3 (C3) and Course 14 (C14) instructors in the SED program reported that using technology in the university classroom has been a professional development focus for the past two years. 83% of the competencies were identified as being met for

C3. However, only 75% of the competencies are recognized as being met for C14. These were among the highest percentage reported from courses other than Course 16 (C16) and Course 7 (C7), the standalone technology course.

**Lack of Technology Implementation**

Data revealed that not all teacher education faculty implement technology in the university classroom, as identified by the TETCs. Table 5 below shows that 31% of the faculty met less than half of the twelve competencies. Moreover, only 26% of the faculty completed ten or more. Many faculty scored in the average range, meeting seven to nine competencies. Furthermore, Table 2 and Table 3 above reveal that faculty for Course 6 (C6), Course 8 (C8), and Course 10 (C10) recorded evidence for meeting only three competencies. The instructor of C11 reported meeting only two competencies. C8, C10, and C11 are unique to the SPLED Program. The instructor of Course 15 (C15) indicated meeting only one of the twelve competencies. C15 is distinctive to the SED program.

**Table 5**

*Number of Faculty Meeting Competencies*

| Number of TETCs | Number of Faculty N = 16 | Percentage per TETC | TETC Grouped Percentage |
|---|---|---|---|
| 1 | 1 | 6.25% | 31% |
| 2 | 1 | 6.25% | |
| 3 | 3 | 18.75% | |
| 4 | 0 | 0% | |
| 5 | 0 | 0% | |
| 6 | 0 | 0% | |
| **Number of TETCs** | **Number of Faculty N = 16** | **Percentage per TETC** | **TETC Grouped Percentage** |
| 7 | 2 | 12.5% | 89% |
| 8 | 1 | 6.25% | |
| 9 | 4 | 25% | |
| 10 | 2 | 12.5% | 26% |
| 11 | 0 | 0% | |
| 12 | 2 | 12.5% | |

## Digital Presentation of Content

The faculty reported technology used in courses to meet the twelve TETCs. The activities and assignments were grouped according to information presentation, interaction, and communication (Table 6). Information presentation denotes that the teacher or the student used technology to present course content. Interactive technology requires students to use online resources for an activity or assignment.

Finally, the technology used for teacher/student or student/student communication was identified.

As noted in Table 6, faculty used technology to present information in all but one of the twelve Teacher Education Technology Competencies. Examples of how technology was used to present information included YouTube videos, podcasts, PowerPoint, digital presentations, websites, apps, and Tk20, the assessment management system for collecting program data. Moreover, faculty reported using interactive technology for only five of the competencies. Digital scavenger hunts, online quizzes or exams, and cell phone screen mirroring with Apple TV were among the ways teacher educators used technology to promote teacher-candidate interaction with the course content. Finally, using technology to communicate within the course was recognized as a category of the activities and assignments reported by the faculty. Communicating through email and discussions in the learning management system were examples of how teacher educators described meeting five competencies.

**Table 6**
*Technology Activities and Assignments*

| TETC | Information Presentation | Interactive | Communication |
|---|---|---|---|
| **1** | YouTube videos, The Teaching Channel, TED Talks, classroom observations of technology in school classrooms, PowerPoint digital presentations, podcasts, TEP Lesson Plan template | Digital scavenger hunts, online scavenger hunts | No data |
| **2** | Tk20 for key assessments and TK20 portfolio reports, online courses/assessments, daily online reflections, apps, and websites for Common Core State Standards | Administering tests and quizzes online | No data |
| **3** | Develop lesson plans, discussions, Tk20 reflections, group projects, microteaching/lessons using technology, unit plan presentations | No data | Discussions and emails |
| **4** | Mobiles apps listing state standards, Prezi | Kahoot, online tests, and quizzes | Discussions and emails |
| **5** | YouTube, PowerPoint, podcasts, NOVA, TED Talks, developing lesson plans | No data | No data |
| **6** | Tk20 rubrics, in-class activity demonstrating various assessment strategies | Kahoot; Apple TV/cell phone mirroring | No data |
| **7** | Hybrid course modeling technology use, candidates' lessons with Media Site | No data | Discussions |

| | | | |
|---|---|---|---|
| **8** | No data | No data | Discussions and emails |
| **TETC** | **Information Presentation** | **Interactive** | **Communication** |
| **9** | Lecture and activity demonstrating the appropriate use of technology in parent-teacher, parent-administrator, teacher-student scenarios, fair use, podcasts, presentations using copyright-free materials, development of lesson plans, presentations using copyright-free materials, and design of curriculum following legal, ethical, and socially responsible uses of technology | No data | Discussions |
| **10** | Defining goals to integrate technology, Tk20 reflections, interaction with cooperating teachers, and observations in the public schools | No data | No data |
| **11** | Focus Week, mini-lesson instruction, modeling using Media Sites, Kappa Delta Pi publications, professional research organizations for potential membership, lesson plan template, locating and using ISTE Standards in developing a lesson | No data | Discussions |
| **12** | YouTube, Prezi, Kahoot, document camera, Apple TV through iPad and Mac, Phonic Vocab | Using online resources | No data |

Findings exposed areas for improvement in teacher educators' implementation of technology in teacher education programs. The data revealed disparities between upper-division coursework within the two teacher education programs. Courses without a field experience requirement did not meet as many competencies as courses with a field experience component. In addition, when implementing technology, faculty rely on digital content for presentations. Finally, the data disclosed that not all teacher educators in the teacher education program implement technology in the classroom. The data also revealed that not all courses offer teacher candidates an example of effectively using technology in the classroom.

**Discussion**

Teacher educators must use technology throughout teacher education programs to model best practices for teacher candidates. The Teacher Education Technology Competencies (TETCs) are designed to strengthen the use of technology in university classrooms and provide a foundation for accountability. Although the data revealed how the faculty use technology to model best practices for teacher candidates, the study denotes that more can be done to improve the use of technology in teacher education programs.

The disparities in the use of technology in upper-division coursework indicate the need for creating professional learning communities where faculty can share their practices with other faculty. Faculty who are confident in using technology should be encouraged to discuss their strategies. The expectations of upper-division coursework need to be consistent with both programs. Since teacher candidates will complete their student teaching or internship after these courses, the effective use of technology in upper-division courses is essential in teacher education programs. Since these upper-division courses are methods, faculty must successfully teach candidates how to use technology for effective classroom instruction. When teacher candidates experience technology-infused methods courses, they are more likely to use technology in their student teaching experience (Buss et al., 2017; Bell et al., 2013).

However, Foulger et al. (2012) warn that not all methods instructors may be experts in implementing technology effectively. Teacher educators must share and collaborate on how the TETCs are met in courses throughout the teacher education programs (Oliver & Townsend, 2013). During our investigation, faculty were presented with the TETCs for the first time. The TETCs provide a framework on which collaboration needs to occur.

The programs in the study are aligned with the Interstate Teaching Assessment and Support Consortium (InTASC) Standards. Standard 5, Application of Content, states, "The teacher understands how to connect concepts and use differing perspectives to engage learners in critical thinking, creativity, and collaborative problem solving related to authentic local and global issues" (Council of Chief State School Officers, 2013). However, the TETC that faculty provided the least amount of data was Competency 8; t*eacher educators will use technology to connect globally with a variety of regions and cultures.* This competency addresses global issues and ethical responsibilities and promotes a shared vision and advocacy of technology use in the classroom.

TETC 8 complements InTASC Standard 5. They work in conjunction to effectively prepare teacher candidates to consider global perspectives in the classroom. Examining the Program's use of technology and determining how to meet TETC 8 must be a priority for teacher educators to create a shared vision, as advocated by Oliver and Townsend (2013).

The authors feel this was a missed opportunity to use technology to connect with others and allow students to use technology as a vehicle to promote learning in context or situated cognition, learning within the context of one's cultural experiences and background (Viner, 2021). According to Viner (2021), technology can bring experts from around the world into the university classroom as models. These can be in the form of content area experts or taking advantage of current events such as the Olympics to apply Math applications to sporting events. In addition, students could create technology artifacts or products to demonstrate knowledge of their culture, such as culturally relevant stories to teach others.

The alignment of the TETCs to the courses with a field experience requirement was promising in both programs. Since these courses make purposeful and intentional connections of theory to practice, the nature of the curriculum lends itself to effectively implementing technology. In addition to the structure of the course, the faculty in the study serve as supervisors when students are in the field. Faculty observe and provide feedback to teacher candidates during their student teaching experience in the public school classroom. Observations in the public-school classrooms allow the faculty to observe how technology is implemented and stay current with how teachers use technology in public school classrooms.  However, not all courses require field experience, and not all faculty observe teacher candidates in the classroom.

Technology implementation must go beyond presenting the information. Faculty rely primarily on presentation modes. Coyne et al. (2017) concur that the type of technology preservice teachers saw their professors use was often limited to PowerPoint and YouTube videos. This necessitates the need for professional development on how technology can be used more effectively in the university classroom. This initial program review of the TETCs indicates that teacher educators in the undergraduate secondary education (SED) program and the undergraduate blended elementary and special education (SPLED) Program need professional development to understand and meet the TETCs. The study provided the context for teacher educators to become aware of the competencies.

The next step is to analyze the competencies further and determine how they will result in program improvement. In addition to examining the competencies, teacher educators must self-examine their pedagogy. The desired outcome is to create a culture of continual exploration of the effective use of technology in teacher education. Professional development will incorporate opportunities for educators to share successful implementation. Although educators can support one another, additional resources will be considered. How and in what ways can teacher educators be further supported? The administration will need to investigate the effective use of resources to support teacher educators. In addition to professional development, resources, such as personnel and equipment, must be explored.

Designating and compensating a faculty member to serve as a technology assistant for all teacher educators would provide additional support for teacher educators. University classrooms must be equipped with up-to-date technology used in public school classrooms. Buss et al. (2017) posit that sustained professional development is required to make sure faculty use current educational technology and that they can instruct teacher candidates on how to use technology in the classroom. Foulger et al. (2012) agree that "ensuring that knowledgeable, content-focused faculty also embrace and remain current on the newest technologies and resources will be an ongoing need as technology-infused courses become the primary mode through which candidates learn to integrate technology into their instruction" (p. 56). Support must be provided if teacher educators are to model best practices for using technology in the classroom. The TETCs provide the foundation for professional development as technology plays a more prominent role in teacher education.

Professional development will need to address the comprehensive alignment of the competencies. The critical nature of using technology in the classroom will be reinforced. Teacher educators must use technology effectively to prepare teacher candidates to prepare P12 students to become college and career ready subsequently. The use of technology in teacher education is no longer a novelty; the demands of the teaching profession necessitate it.

Although the faculty in the teacher education programs reported a variety of ways technology is used in the university classroom, the data provides a baseline to begin discussions on improving technology integration at the individual course level based on the TETCs. The TETCs provided the teacher education programs in this study with a foundation for identifying weaknesses and strengths in faculty modeling the effective use of technology in the university classroom. The competencies can be used to inform and guide program reviews and initiatives for continual improvement.  Technology integration should not be seen as an "add-on" but rather as "invisible."  Technology should not be deemed as an addition to the curriculum but embedded seamlessly into the pedagogy of teacher educators.

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# Questioning Techniques in the Online Environment: A Checklist for Education Professionals

Kelly Jackson Charles

University of the West Indies - Five Islands Campus

## Introduction

Instructors use questions to ascertain students' understanding of concepts and processes related to the intended learning outcomes of the lesson. Teachers can evaluate individual student and group responses to questions to know the degree of progress learners have made toward the learning goals. "A student's ability to articulate an understanding and their point of view is valued by faculty…Holding one's own in classroom discussions and clear articulation of thought is important." (Hill, 2012). Some claim that questioning in the online environment poses unique challenges due to the lack of non-verbal cues (Montello & Bonnel, 2009) among faculty and students, as well as issues with wait time, eye contact, and tone (Montello & Bonnel, 2009).

Oftentimes, questions delivered in the online environment are misunderstood by learners. Good questions can result in more motivated students, deep learning, and critical thinking opportunities. The unique strategies and tools for questioning that are effective within the online environment are not widely known among instructors of record. Blosser (2000) asserts that even in the traditional classroom, "As teachers, we sometimes get so involved in asking questions that we don't give much time to analyzing why and how we do it; questioning seems such a natural technique." Without focused professional development and training in pedagogical methods related to questioning strategies, online instructors may never examine their approaches to question design, specific techniques in implementation, or the quality of responses their questions evoke from learners. This article seeks to add to the body of knowledge and offer questioning techniques for effective online discussions and overall student learning.

Our goal as online instructors is to bring about conceptual change in our students, regardless of their physical location. Pertinent questions about course content and student learning outcomes help to facilitate this process. The types of questions posed in the online environment can help learners think more profoundly and utilize high-order thinking skills, such as analyzing, evaluating, and creating. Lower-level questions are typically at the remember and understand levels of Bloom's Taxonomy. Additionally, specific questions can encourage online learners to assume an active part in virtual interaction rather than sit quietly and passively behind the screen. For example, Thompson (1997) suggests a salesperson technique of asking a closed-ended question, such as a Yes/No question, to initiate a discussion, followed by an open-ended question. Then, once students have committed to responding to the Yes/No question either verbally or in the chat/message box, it is easier for them to maintain the interaction by responding to the open-ended follow-up question, which, of course, requires a richer, more descriptive reply.

Another strategy that may help to reduce the impersonal nature of the online learning environment is to "personalizing at least some of the questions that they ask, inviting their learners to talk about themselves rather than only talking about information provided by the textbook" (Thompson, 1997) or lecture notes, by way of asking questions related to personal fact or experiences from students' careers or lives, in general. This technique allows learners to have some contribution and control over the course content, which could increase learners' investment and motivation in the online learning process and community. How can online instructors successfully implement questioning techniques within the virtual learning environment? What considerations are there for question types and online tools and resources that might be useful in supporting these efforts?

To guide both new and experienced online educators in the development of questions, the author reviewed a number of research-verified and best practices to organize a checklist, which could be used to improve the question-and-answer process and results in the online learning environment.

**A Questioning Checklist for Online Instructors**

**1. Consider the Form of the Question: Open or Closed**

Closed-ended questions have a restricted set of appropriate responses, such as True or False, Yes or No, and Right or Wrong. The instructor can easily anticipate these restricted responses. Emoji reactions to closed-ended questions may help students feel more connected with their peers and instructors. Researchers conclude that the online classroom offers a "pedagogically limited learning experience," and virtual learning "inevitably increases the transactional distance between students and their instructors" (Zhou & Landa, 2021). However, emoticons, images, and avatars are sometimes used in virtual learning experiences as communication tools to convey answers to questions, feelings, and tones to learners. These emojis "filled the socio-emotional gap and allowed students to navigate the available online spaces effectively for optimal intellectual development, positive learning outcomes, and social progression." These online learning environment decorative features give students greater control over their communication process regarding speed and creativity. Open-ended questions can also have a variety of appropriate or relevant responses, most of which are not anticipated by the instructor. Open and closed-ended questions are aligned with each Bloom's Taxonomy level.

**2. Consider the Content of the Question**

There are various question types related to knowledge and skill levels: application and interpretation, connective and causal effect, comparative, evaluative, critical, opinion, personal fact, and outside fact questions. In the online environment, the instructor may ask students to post in the chat what they believe the key terms and definitions are for a particular concept or reading in response to the factual question, "What are the most important terms and ideas in the reading" (Svinicki & McKeachie, 2014).

Interpretation and application questions could be presented to students in a whole group. Then the instructor could organize breakout rooms so that small groups of students can work to answer the question, "How does the idea from last week's module apply to this concept?" Learners could then return to the whole group and discuss the interpretations. This approach stimulates higher-order thinking compared to asking one student, "What is the definition of ____?". Students might also be asked, "What are the potential causes for an event?" This causal effect question could be answered by way of a "Think, Pair, Share" strategy within the virtual learning environment, which allows students to think about their response for a short period (e.g., 5 minutes), exchange ideas with a partner by way of a private chat, and then share out to the whole group in the main room. Suppose students need to be able to compare phenomena or theories in an online class. In that case, the instructor may ask students a comparative question, such as, "How would you compare Author A to Author B?" Students could work independently on the comparison using an online mind mapping tool and then share a link with classrooms to brainstorm and collaborate in real-time. Students could submit their ideas on a whiteboard feature or submit them on a discussion board so that each student can review the mind map. When developing evaluative-type questions, instructors may want learners to judge the value of an idea or mark a solution as "efficient" or "inefficient," as an example. In the online course, an instructor may ask students to respond to this question by completing an embedded poll question. Then, students can share their selection to the poll, along with a brief rationale.

The instructor may want learners to develop novel solutions or create alternative perspectives when presented with critical questions. Students could respond with a voice thread or recorded message and upload their artifacts to the chat or discussion board so that classmates can review and comment on their ideas. Some experts suggest that calling students by name to respond to personal facts or opinion questions is appropriate for building confidence in the online community. However, calling students by name for outside fact questions can be demeaning if the student does not respond accurately. "Only call on participants by name when you want them to respond to an opinion-based question versus questions that have an absolute right or wrong answer. You want to preserve their self-esteem by not putting them on the spot" (Brashear, 2022).

Since many students make a note of instructor questions when they are preparing for examinations, it is also important to select the content in this step that is most relevant to the learning goals for the course. Emphasizing trivial concepts may mislead learners (University of Illinois Urbana-Champaign, 2022).

**3. Consider the Purpose of the Question**

The purpose of the question may be to: (a) gauge students' progress toward a learning outcome, such as "How does this image project on the screen impact your impression of the victim?", (b) inquire about maintenance, such as "Can you see my screen?", (c) emphasize an important concept, reflection, or connection, such as "What was the most upbeat section of the composition?" or (d) stimulate thinking, such as "What information do we need to include in a letter to the mayoral candidate?"

**4. Plan and Script**

Writing down the focused questions in a lesson plan or embedded within lecture notes can help the instructor prepare for the online instructional set. This is called *scripting*, and it allows the instructor to arrange a logical sequence for the questions, plan for follow-up scenarios and rephrase the question in case students need further prompting or clarification in real-time. Writing down the questions aligned with the learning goals also presents the instructor an opportunity to anticipate learners' responses and consider common misconceptions that may need to be discussed during the lesson.

**5. Consider What Type of Answer the Learners Should Provide in Response to the Question**

Responses could include a live verbal answer, a text-based reaction, recorded voice notes, a poll selection, an image, or something designed like a concept map. Instructors should indicate to students, during the instructions, the expectations for responding. Without guidance, learners are left to figure out how to answer the question or not feel obligated to respond at all. Also, should the answer be individually crafted or constructed by a group? For example, "Students can signal agreement and disagreement or 'yes' and 'no' with thumbs up or down," shares Kassner (1998, p.32). Kassner adds, "They can generate examples that illustrate a concept, predict an outcome when given a set of circumstances, invent a metaphor or analogy for a concept or procedure, and work in small groups to summarize a lecture and check each other's understanding of the presented material."

**6. Present the Question**

In the online environment, there are several ways to present focused questions. Some of these ways include asking the question verbally in the whole group, typing a prompt in the chat feature of the learning management or web conference system, posing a written question from a deck, screen, or whiteboard presentation that is shared with the whole group, posting read-ahead questions to students, sending a message to small breakout groups, relaying questions in an audio or video file, embedding a poll question in the presentation, or posting questions in a discussion board. "Asking verbally and expecting questions through a chat can work really well for small groups," suggests instructor David Martin of the University of Dundee. Other online formats for questioning include more formal classroom assessment techniques, such as sharing questions through quizzes, games, essays, short papers, drag-and-drop activities, branching scenarios, scavenger hunts, and self-assessments (Colman, 2022; Kosslyn, 2021).

### 7. Think About in What Ways Learners' Answers can be Acknowledged and Evaluated

There are many affirmative ways to reply to students' responses, including praise, for example, "Way to Go, AJ"; redirection, such as "That answer might need some additional information. Would you like to call on a classmate to assist you?"; further prompting to include, "That is the complete list. Can you recall the order of the tasks?"; correction, for example, "That answer is close. Would you like to take another attempt?"; and asking a new question, like "That is a strong claim. Based on that, I would like to hear your thoughts on the next question".

Positive reactions following a student's response, such as "Thank You for Responding," may also encourage further student participation. In the online environment, visual cues are not the same as those common in the seated learning environment. Instead of eye contact and head nods, the instructor may need to consider alternative methods of communicating that an answer is correct using virtual cues, such as badges or easter eggs. Badges are a form of online rewards and digital currency. Easter eggs are surprising elements in a training program, such as a hidden clue in a case study, a logo uncovered on a slide deck, or an image that reveals additional information within the lecture notes. As a best practice, exploring more in-depth student responses to identify misconceptions is essential. It might also be helpful for students if the instructor acknowledges all responses regardless of accuracy because this reinforces the sense of community and belongingness in a virtual classroom.

In the online environment, instructors should design questions based on the thinking skills required for the lesson's learning outcomes. Planning to use a variety of tools within the online teaching and learning environment in the absence of intended learning outcomes and a thorough knowledge of the curriculum content will result in a waste of time and effort. But, with a clear set of indicators of what students should know and be able to do at the close of a lesson, research-based strategies, and a willingness to incorporate sound questioning methods, an online instructor can maximize communication for all stakeholders.

Based on the modality of the course, online instructors can vary their questioning style, type, and reactions. Students can respond to an instructor's question through creative expression, higher-order thinking, and in a collaborative format. Committed online instructors should take the time to preview a number of these strategies and embedded resources and become familiar with one or two that show promise as vehicles for making the questioning process more effective and less stressful.

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# A Valuable Lesson: Linking Pedagogy with Technology Use for Pre-service Teachers

Donna Short, Austin Peay State University

**Abstract**

The purpose of this article is to take steps to improve an evaluation tool that better assesses how pre-service teachers implement their technology course training skills during their field experiences. Even though fundamental technology competencies are appropriate for pre-service teachers to demonstrate during their field experiences (Brush et al., 2008), there is a need to delve further into asking why. Pertinent survey questions that require pre-service teachers to demonstrate successful technology, pedagogy, and content integration into their lessons can help EPPs to reflect on best practices. Implementing the Technological Pedagogical Content Knowledge (TPACK) Framework is a valuable tool that an EPP can utilize to collect credible data that focuses on technology, pedagogy, and content.

**Keywords:** TPACK Model, technology, pedagogy

This article emphasizes Educator Preparation Programs (EPP), gaining an in-depth understanding of why it is important to ask pre-service teachers critical probing questions about their ability to interconnect technology with their pedagogy and content knowledge training. Research indicates a mismatch between pedagogical beliefs and technology integration among classroom teacher practices (Chen, 2018). Therefore, the importance of EPPs providing opportunities for pre-service teachers to demonstrate their training and understanding of technology based on pedagogy and content during student teaching can influence all educators involved. In fact, pre-service teachers who utilize technology for pedagogical goals are more likely to improve themselves concerning technology utilization for educational purposes (Bağcı & Atar, 2018). Training pre-service teachers to regard technology as purposeful and not for the sake of using it (Atar et al., 2019) authenticates clear, supporting lesson objectives as well. Four areas for advancing educational technology in teacher preparation include engaging technology to problem-solve, sustainable systems that support training, alignment with research-based standards, and frameworks ensuring program-rich experiences (U.S. Dept. of Education, 2017). In order to ensure that educational technology is continuously advancing in these four areas, there needs to be ongoing and intentional support that explicitly evaluates a pre-service teacher's knowledge of the intersection of technology, pedagogy, and content during their student teaching. Pre-service teachers can gain more from a surplus of "program–deep and program-wide" (U.S. Dept. of Education, 2017, p. 35); technology resources are expected to explain the pedagogy and content rationale. The overall significance of this article is to provide actionable steps using the TPACK model to guide EPPs in their efforts to ask more meaningful and critical questions about the use of technology during student teaching.

**Instructional Technology: Pre-service Teacher Training**

Like other EPP courses, technology courses align with the Interstate Teacher Assessment and Support Consortium (InTASC) standards outlining all content areas across grade levels to improve classroom learning. Additionally, several technology models address the importance of incorporating technology, pedagogy, and content integration into pre-service training. The technological Pedagogical Content Knowledge (TPACK) model, Substitution Augmentation Modification Redefinition (SAMR) model, and Technology Integration Matrix (TIM) framework are a few examples of technology models that include detailed steps on how to connect appropriate technology skills with pedagogy and content.

A typical introductory educational technology course description may include competencies in microcomputer applications in the instructional process, the use of instructional software, media integration, and the use of micros in classroom management. Additionally, a course may require students to develop a digital repository of educational resources aligned with the InTASC standards. Students provide in their digital repository a web link to each resource and then go on to describe what each resource is or does, how it will help them meet the specified InTASC standard, and at least two specific and detailed ways they plan to use it in their future classroom. According to the U.S. Department of Education (2017), “every new teacher should be prepared to model how to select and use the most appropriate apps and tools to support learning” (p. 36). The concern is not with developing a digital repository; instead, the question is whether an EPP identifies pre-service teachers’ application of their “knowledge on integrating elements of pedagogy, learning theory, and technology” (Muniandy et al., 2007, p. 51). The training provided by an EPP should involve helping pre-service teachers become familiar with what technology tools are useful in the classroom. However, the training does not stop here. There must be continued efforts to ask the important questions that require pre-service teachers to explain why they use this technology.

**TPACK: Asking Pre-service Teachers the Right Questions**

Asking the pre-service teachers critical, probing questions opens a door for them to be reflective practitioners when explaining the interconnectedness of technology, pedagogy, and content knowledge. In order for an EPP to accurately assess the technology course training during student teaching, the technology models such as TPACK can offer insight into creating a valid assessment. As Marsh and Roche (1997) argue, selecting survey questions is essential in ensuring that results are valid measures of teaching effectiveness (p. 1187). Surveys should reflect current pedagogical and institutional practices and priorities that are reliable and valid to ensure quality.

Schmidt et al.'s (2009) development of the technological pedagogical content knowledge (TPACK) supports the practical approach to assessing the pre-service teachers' use of technology during student teaching (Tondeur et al., 2019). TPACK Framework emphasizes the importance of a teacher's training and knowledge in the intersections of technology, pedagogy, and content. In Figure 1, the intersection of technological knowledge, technological content knowledge, and technological pedagogical knowledge furthers why pre-service teachers need to comprehend more than technological knowledge.

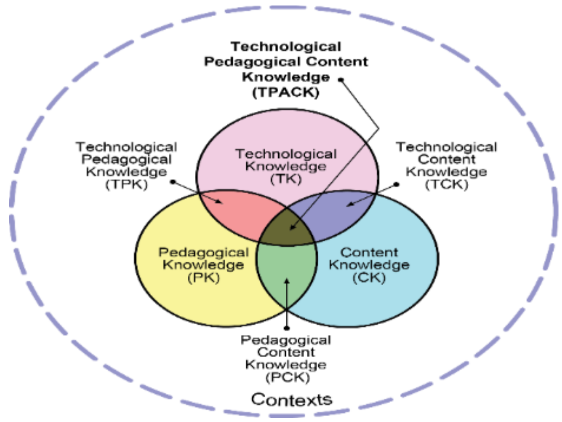


Figure 1: *Technological Pedagogical Content Knowledge (TPACK) Framework*

According to Etmer and Ottenbreit-Leftwich (2010), a response of “why” instead of “what” technology tools implemented by pre-service teachers during student teaching is not about how much technology is used but rather why it is used. The critical questioning using TPACK can focus on the “why” so that higher-order thinking about the use of technology can be more than just a factual response. For example, the two open-ended questions (Table 1) focus on the pre-service teacher’s use of technology in the classroom. Unfortunately, what technology is used may result in factual responses with possibly no further explanations as to why the pre-service teacher used the technology. However, changing the language to reflect a higher-order thinking question can result in a better understanding of the pre-service teacher’s technological pedagogical content knowledge. When posing this question, a more reflective pre-service teacher can explain the interconnectedness of technological pedagogical content knowledge (TPACK) that benefits an EPP’s ability to assess their program practices.

**Table 1**
*Technology Usage*

| What Technology is Used | Why Technology is Used |
|---|---|
| What technology did you use to support your students' learning during student teaching? | Describe a specific teaching moment where you effectively demonstrated or modeled combining content, technologies, and teaching approaches in the classroom. |

With the implementation of the TPACK Framework, an EPP can create higher-order questioning that requires pre-service teachers to delve further into their technology training and integrate other course training**.** Gronseth et al. point out that technology courses taught in isolation from other classes do not reflect how teachers should use technology in the classroom (2010).

## Conclusion

Using the TPACK model framework is advantageous for EPPs to understand the effectiveness of their training of pre-service teachers. Collaboration to find a commonality in connecting higher academic courses such as technology, pedagogy, and content can provide meaningful learning to their pre-service teachers. When EPPs make program connections, then pre-service teachers can make content connections.

Actionable insights into pre-service technology training can lead to higher-order thinking skills, more in-depth survey questions, and actionable data. If EPPs require their pre-service teachers to implement productive technology strategies within their K-

12 field experiences, then EPPs need to focus on how they can ask better questions that reflect the training of pre-service teachers. The TPACK model framework combines intentional and transparent approaches to improve the higher academic curricular design. Providing pre-service teachers with a purposeful opportunity to share their knowledge rather than knowing a plethora of technology information is the best lesson they can learn.

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**Social Media: Impacts and Solutions for Adolescence**

Barry Bruster, Professor
Austin Peay State University
Megan Miller, Student
University of Tennessee

The Internet keeps exploding with users of social media. Over 1.9 billion websites exist on the Internet, with an estimation that over 600 million of them have blogs. (Latest Blogging Trends, 2023). In 2018, two billion plus blog posts were posted worldwide at roughly 5,760,000 blog posts per day and approximately 4,000 blog posts per minute, and the number of bloggers in the United States exceeded 31.7 million users in 2020. (Latest Blogging Trends, 2023). According to Minaev, 2023 the Internet Statistics 2023: Facts You Need-to-Know. First Site Guide, the following key Internet facts and statistics are reported:

- There are over 5.47 billion active internet users.
- As of February 2022, China has over 1 billion active users.
- There are more than 1.98 billion websites online.
- 4.32 billion people use their mobile devices to go online.
- There are 198.4 million active websites on the web.
- Around 7 million blog posts get published per day.
- There were 4.2 billion active social media users in 2021.
- 47% of internet users globally use an ad-blocker today.
- Cybercrime cost $3.5 billion for U.S. businesses in 2019.
- Twenty-six smart objects are located near every human on earth.
- As of 2021, more than 500 hours of video are uploaded to YouTube every minute.

These are just a fraction of the social media icons on the Internet; see Figure 1. What is each social media Icon? Start on the top row and progress through the rows to evaluate


**Figure 1. Social Media Quiz**

The first row consists of Facebook, YouTube, WhatsApp, and Facebook Messenger. The second row consists of WeChat, Instagram, Q.Q. (Tencent Q.Q. Chinese Instant Messaging Software), and Tumblr. The third row consists of TikTok, Twitter, Reddit, and LinkedIn. The fourth row consists of Viber, Snapchat, Pinterest, and Telegram.

This paper addresses the following six areas of social media.

1. Today's Internet
2. Celebrity Opinions on Social Media
3. Social Media Survey Results and Trends
4. Social Media Positive Impacts on Adolescents
5. Social Media Negative Impacts on Adolescents
6. Solutions to Social Media Conundrums

According to the article 10 Advantages of the Internet for Life and Happiness (2020), the "good" is reflected in the following ten tenants:

1. Connection – the Internet connects the entire world almost.
2. Communication – there is massive communication across the globe as well. WiFi gives many options.
3. Convenience – life is made more accessible by using eCommerce, Electronic Signatures, navigation, current news posts, booking stays, etc.
4. Access to information – quick access is provided. No more encyclopedias are needed! Insight, facts, and understanding are given to the masses.

5. Education - scholarly references, tutoring, Massive Open Online Courses (MOOCs), and YouTube videos are easily provided.
6. Entertainment - watching the latest films, series, and viral videos, listening to music, and virtually meeting with friends is instantly available
7. Better Yourself – it is possible to upskill yourself, seek new jobs quickly, and work on technical certifications.
8. Find a Voice and Do Good - start a blog or a vlog, become famous on social media, and express yourself.
9. Improve Job Prospects - generate income on Instagram and/or Fund Me, import and sell products.
10. Technological Advancements – learn about and incorporate robots, artificial intelligence, virtual reality, augmented reality, and machine learning.

The Internet, also known as the Internet of Everything (IoE), is represented by three web levels: 1) the Surface Web, 2) the Deep Web, and 3) the Dark Web. (Worthman) The IoE is a concept that extends the Internet of Things (IoT) emphasis on machine-to-machine (M2M) communications to describe a more complex system that also encompasses people and processes. (Worthman, 2015) See Figure 2 for these areas.

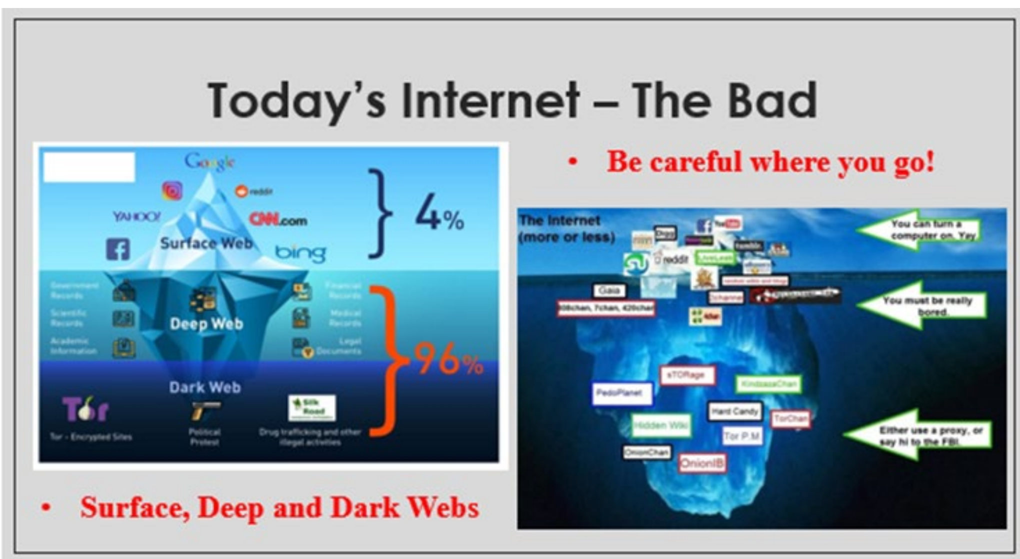


**Figure 2. Today's Internet – The Bad**

The Surface Web represents about four percent of the Internet, which is often accessed daily and is easy to access. It is the part of the web that any search engine can access, such as the Google crawler that catalogs it (Worthman, 2015).

The Deep Web is the rest of the web that search engines cannot access but can be accessed with certain tools that are common and available. A simple example of a site that has deep content is the Internal Revenue Service site. Estimates are that there are 400 to 500 times the number of domains under the surface than above it (Worthman, 2015).

The Dark Web is a part of the Deep Web that is intentionally hidden; it is virtually impossible to navigate this part of the web without some rather intimate knowledge. Tools like The Onion Router (Tor) and the Invisible Internet Project (I2P) are often used here. Much nefarious activity goes on here. Recently, the Silk Road has exposed that "anything was available for a price." Under-the-radar government spy work is also done at this level (Worthman, 2015). One must be careful where one goes on the Internet. In the Deep Web and especially in the Dark Web, one may be monitored and/or baited in an FBI sting operation (Worthman, 2015).

**Some of the bad things the dark Web supplies include:**

1. Human trafficking
2. Child pornography
3. Selling drugs, weapons, stolen credit card numbers, counterfeit cash, and fake I.D.s
4. Hackers for hire
5. Stolen designs, intellectual property, and counterfeits
6. Vulnerabilities (personal and business accounts that have been hacked)
7. General and specific cyber campaigns (Twitter and Facebook attacks, malvertising, etc.)
8. Hacktivists and other targeting forums such as Chinese, Russian, and North Korean Advanced Persistent Threats (APTs)
9. Viruses, Worms, and Trojans (including ransomware)

10. Ransomware
11. Social Engineering

However, social media has many excellent positive benefits for sending supportive messages used by celebrities and social influencers. Many celebrities publicly recognize much damaging activity on social media.

**The following celebrities have been paraphrased:**

Cara Delevingne – kids should not bully
Edward de Bono – getting more information requires discernment
Queen Rania of Jordan – use social media for social change
Raine Maida – do not be neglectful; screen social media
Emma Watson – social media can be incredibly dangerous
Max Scherzer – things can be taken out of context easily

**Self-reported effects of social media identify:**

1. Eighty percent are easily deceived by others
2. Sixty percent have self-esteem issues
3. Fifty percent have negative relation impacts

Social media survey results identify the popular trends of social media platforms by adults, as shown in Figure 3.

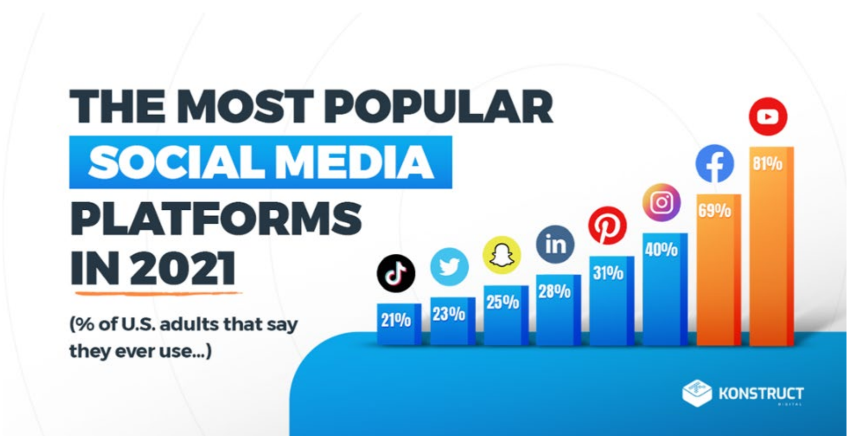


**Figure 3. Percentage of Adults using Popular Social Media Platforms**

The following two charts show social media survey results and trends of teens (Brooks, 2022). See Figures 4 and 5. Only thirty-one percent said they felt "mostly positive" about social media. Seven main reasons for social media's adverse effects are revealed as follows.

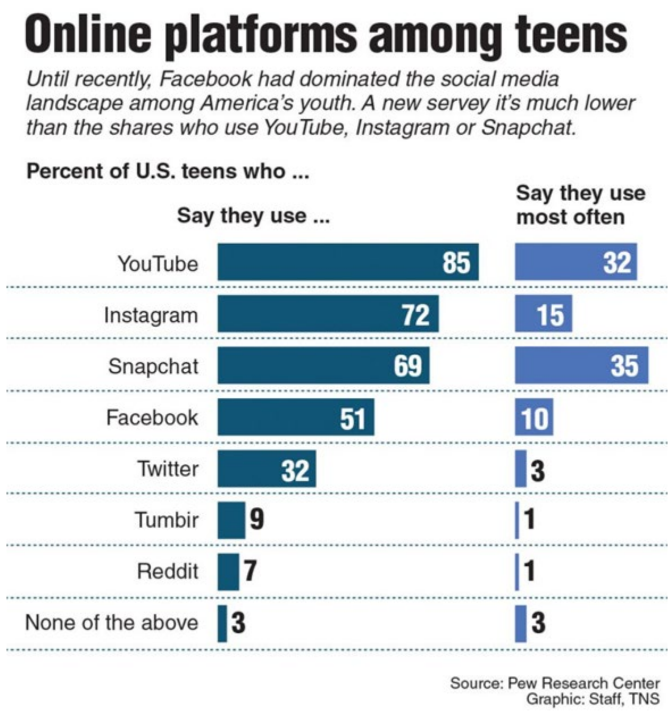


**Figure 4. Teen Use of Social Media**

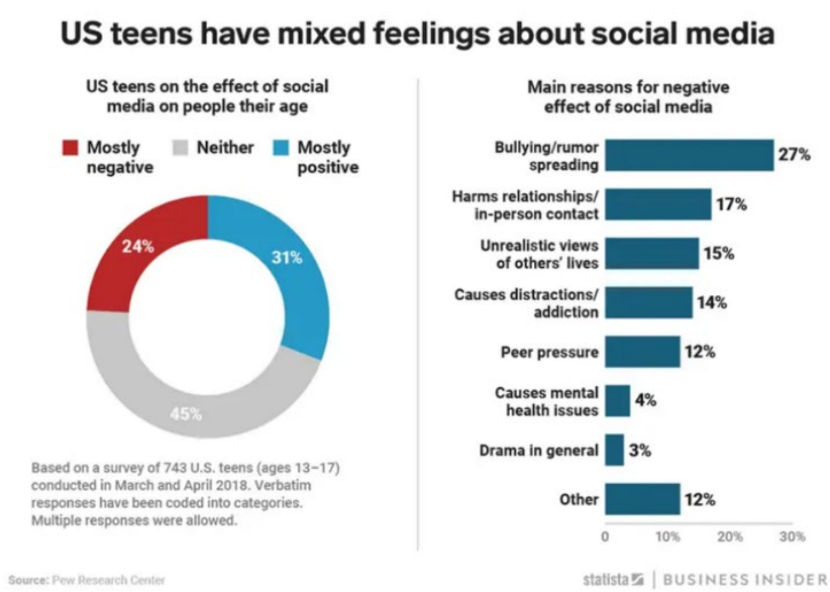


**Figure 5. Teen Feelings about Social Media**

The following two figures are displayed in Figures 6 and 7, social media survey results and trends based on adult politics and general social media fails (Stegner, 2022; Brooks, 2022). Can one see how these influences could be problematic?

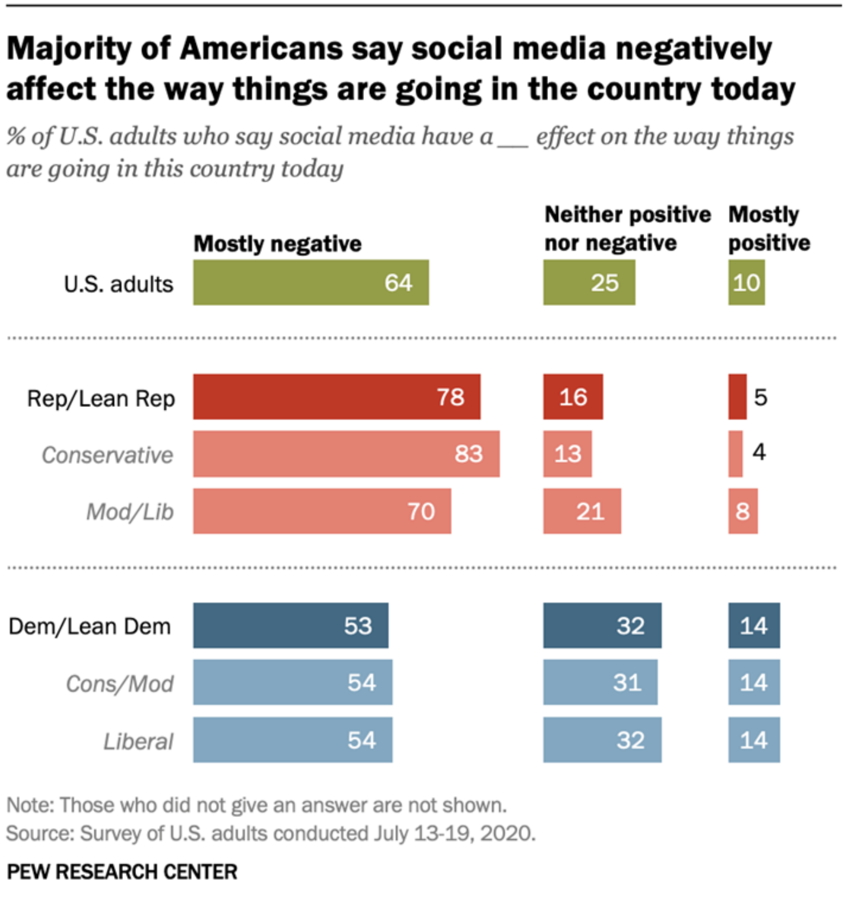


**Figure 6. Negative Reflection**


**Figure 7. Social Media Fails**

In adult social media trends, Lacey Leone McLaughlin, a consultant who has become the "go-to underling whisperer" for bosses perplexed by the very demanding young people who now work for them (McCreesh, 2022). If one uses the Internet, the odds are about even that one will be mistreated there. In 2021, a Pew Research report found that 41 percent of United States adults have personally experienced some form of online harassment. Fifty-five percent think it is a "major problem." Seventy-five percent of the targets of online abuse say their most recent experience was on social media (Brooks, 2018). See Figure 8 below.

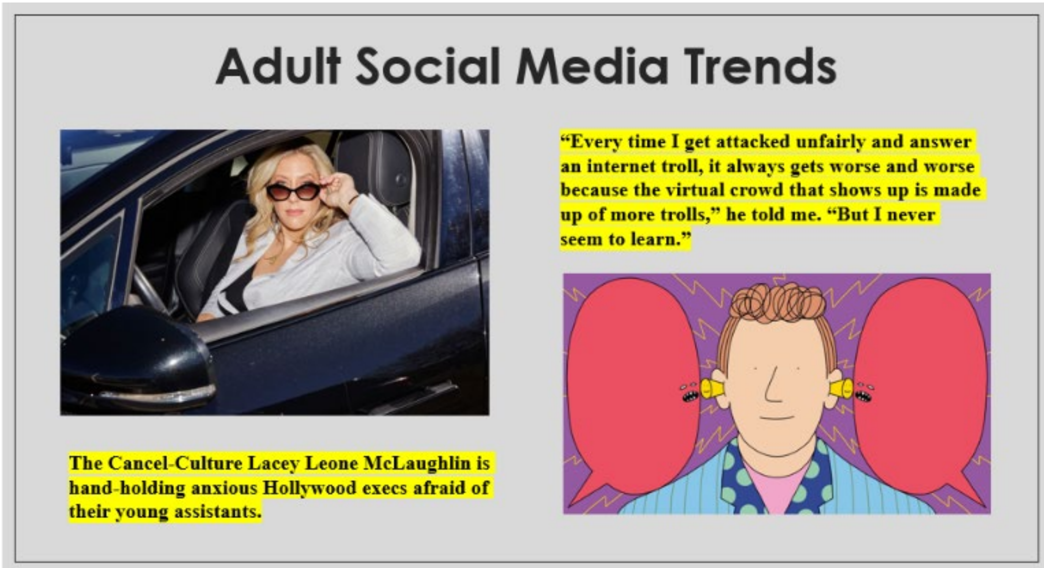


**Figure 8. Adult Social Media Trends (McCreesh, Brooks)**

Social media's positive impacts are fivefold and include the following:

1. Enhancing Communication and Connectivity
2. Planning
3. Social Media Helps in The Noble Deeds (such as raising money for medical needs)
4. Mental Health Benefits (if guarded)
5. Social Media Can Save Lives via Helplines

Social media's negative impacts on adolescents are found in social media such as the TikTok "Hate Me" video and Facebook. Research conducted by Facebook over the past three years indicates its Instagram photo-sharing application harms significant numbers of young users, particularly teenage girls (Wells, 2021). Internal presentations by Facebook researchers concluded that some of the problems were specific to Instagram and not social media at large, especially in instances of social comparison, in which people evaluate themselves against others' attractiveness, wealth, and success. Fighting, shaming, and hate discussion are promoted too! As shown in Figure 9, social media addiction and the "lack of communication" are constantly in question.

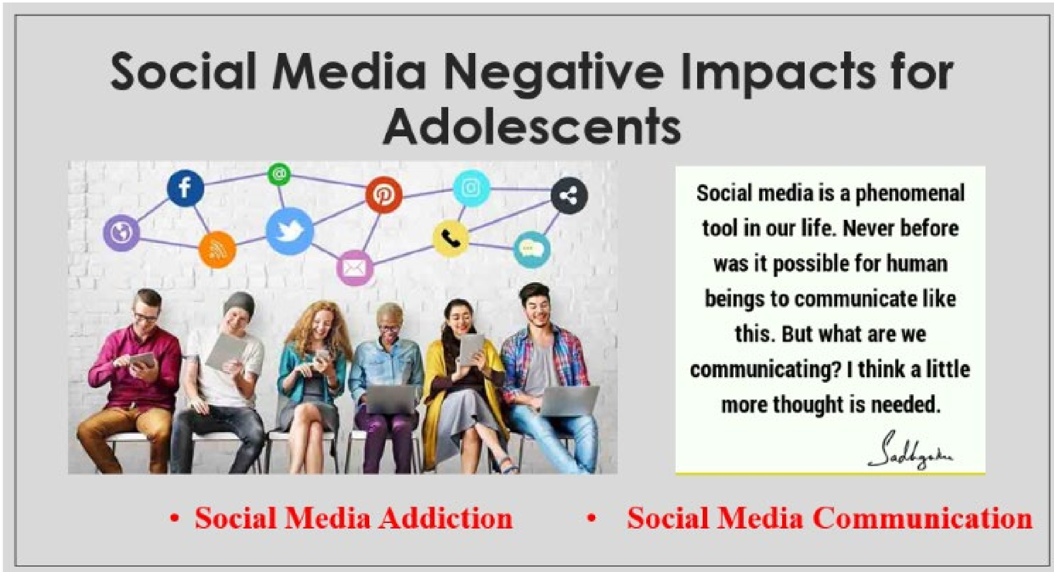


Figure 9. Social Media Negative Impacts on Adolescents

Social Media Negative Impacts identified in Figure 10 include:

- Distraction
- Escape from problems
- Being trolled or experiencing cyberbullying
- Reducing family interaction
- Increasing anxiety, depression, and loneliness


**Figure 10. Social Media Negative Impacts**

Social Media Negative Impacts, shown in Figure 11, include relationships between wealth and education level.

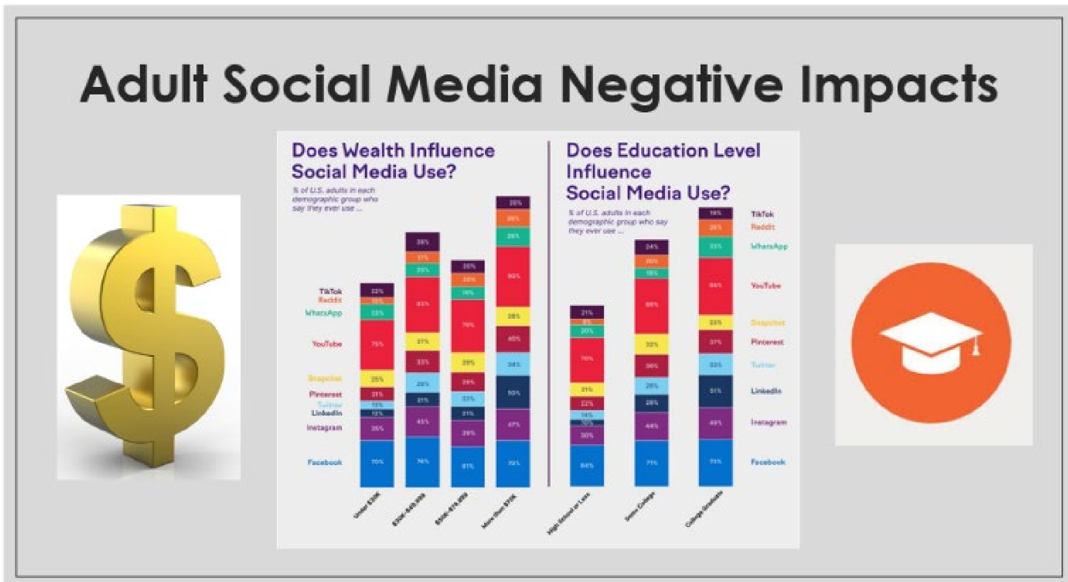


**Figure 11. Adult Social Media Negative Impacts**

Bhasin (2018) identified several negative impacts of social media. See figure 12. The left side illustration identifies many medical problems that can result from social media abuse.

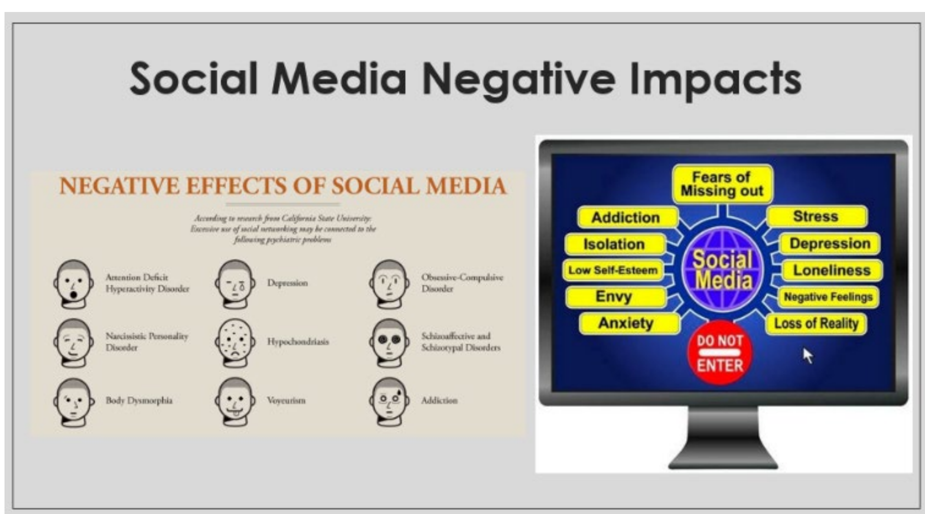


**Figure 12. Social Media Negative Impacts**

Some popular applications like TikTok and Instagram offer "digital well-being" settings to keep you from doom scrolling past bedtime. Realistically, how helpful are these applications; do they help you put your phone down and get some sleep (Camero, 2022)? The adverse effects of social causes depression and loneliness and may ultimately lead to self-harm or suicide. Suicide is recognized in relation to social media for all of society, including youth and the military, as shown in Figure 13.

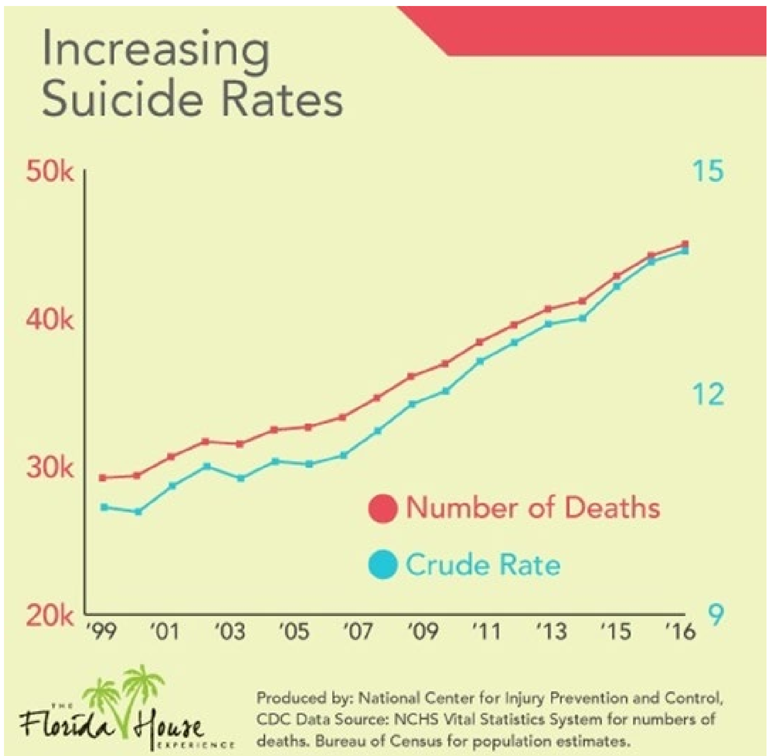


**Figure 13. Social Media Negative Impacts**

The negative impacts of social media on youth are extensive; some of these adverse effects on adolescents are consolidated below since most articles and images do not address all of them together (Bhasin, 2018; Hartikainen, 2021; Sharevski, 2021; Dennen, 2019; Penney, 2018; Bagdy, 2018; Sriplo,2021; Karnyoto, 2021; Jain, 2021).

- Social media addiction
- Lack of real communication
- Distraction
- Escaping problems
- Being trolled
- Cyberbullying
- Cyberstalking
- Being ignored intentionally
- Inappropriate requests
- Reducing family interaction
- Voyeurism
- Anxiety
- Depression
- Loneliness (Isolation)
- Attention Deficit Activity Disorder
- Obsessive-Compulsive Disorder
- Narcissistic Personality Disorder
- Hypochondriasis
- Schizoaffective and Schizotypal Disorders
- Body Dysmorphia
- Imposter Syndrome
- Known Toxic Social Media (Instagram)
- Unrealistic expectations
- Need for instant gratification
- Stress
- False sense of importance
- Irregular sleep
- Negative feelings
- Privacy loss
- Loss of reality (real-life vs. virtual life)
- Low self-esteem
- Social engineering
- Rumor spreading
- Misinformation
- Disinformation
- Envy
- Peer pressure
- Young people as Political Influencers
- Deepfakes
- Discomfort (Embarrassment)
- Drama
- Information siloing
- Suicide
- Bigorexia (body shaming)
- Fear Of Missing Out (FOMO)
- Sexting
- Doxing (docs dropping)
- Cultural appropriation
- Triggering
- Microaggression
- Cancel culture (call-out culture) trends
- Fake News

In Figure 14, solutions for safer social media are shown. This figure includes "10 Things You Can Do Without Social Media," which minimizes use, "Think Before You Post" with adolescents and make sure they understand, and "Things You Should Never Share on Social Media."


**Figure 14. Solutions for Safer Social Media Use**

In conclusion, eleven solutions for better social media use by adolescents are posited: Each is an excellent area for in-depth future research. Parents should:

1. Set examples when checking phones and/or email
2. Strengthen the parent-child bond
    a. Establish technology-free zones and technology-free hours when no one uses mobile devices
    b. Give children full attention when talking
3. Delay the age of first use of social media as much as possible
4. Get children involved in something that they are interested in outside of social media
5. Teach children about the perils of social engineering
6. Teach children not to post sensitive personal data
7. Teach children to think before posting
8. Push for social media education in school
9. Set browser privacy settings on children's devices
10. Check browser history often
11. Set "digital well-being" settings
12. Talk to children about social media use often

**Future research and additional information are needed on the areas listed below:**

1. Survey a large number of teens (female and male) to generate viable, numerically sound data
2. Include suicide clarification and quantification
3. Include LGBTQI+ populations in surveys

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