

## **MicroLearning: Using Twitter Media to Publish and Facilitate Engagement with Innovative Engineering Programs**

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### **Abstract**

How do Colleges of Engineering (CoE) use Twitter as a microlearning platform to promote teaching, learning, and research initiatives; and what are the levels of engagement with these CoE initiatives? This exploratory, work in progress paper investigates the use of Twitter media (photographs and videos) to publish and facilitate engagement with innovative engineering programs. The methodology consists of the use of data analytics, operationalized as Activity Index, and Stakeholder Engagement Index; and content analysis, which is a synthesis of the CoE Twitter feeds into *Innovative Courses/Projects*, *Research*, *Outreach*, and *Public Lectures* categories. The analytics and content analyses results are subsequently presented for 10 selected CoEs. The objective of this study is to identify innovative but impactful and engaging engineering programs, so as to reinforce student success and/or faculty development.

### **Keywords**

Twitter, Engagement, Analytics, Innovative Engineering, Microlearning

### **Introduction**

Twitter, the 140-character, text-photograph-and-video, social media platform is increasingly being leveraged in engineering contexts. For example, Twitter has been used to recruit and engage engineering research participants, facilitate in-class engagement, evaluate student learning, and measure faculty productivity.<sup>1-6</sup> This *explorative, work in progress* study will focus on the use of Twitter media, photographs and videos<sup>7</sup> for *microlearning* (in Engineering): “Learning in short segments”<sup>8</sup> or short bursts of visual but impactful learning that is best enabled through a social media platform like Twitter.

The study objective is to investigate the utility of the open, publicly hosted Twitter media of 10 selected colleges of engineering (CoEs) to reinforce, promote and/or enhance student success and faculty development. Therefore, only CoEs Twitter content that focus on teaching, learning, or research in some context will be investigated. Hence, the *study objective* is to use the results of the ensuing investigation to illuminate innovative teaching, research, and outreach practices, and by extension, student success.

## Methodology

The research questions for this exploratory study are:

- How are CoEs using Twitter to promote teaching, learning, and/or research initiatives?
- What are the levels of engagement with these CoE initiatives?

The methodology consisted of *analytics* and *content analysis* (in August 2017) of the Twitter photographs and videos of 10 selected CoEs, which are peer institutions of the University of Arkansas. Analytics provided data on the Activity Index, e.g., number of *#tweets* and *#videos*; and also Stakeholder Engagement Index, e.g., the number of *#likes* and *#followers*. The raw Twitter media analytics data for the selected 10 CoEs, which is valid for August 5, 2016 and August 30, 2017, the CoEs Twitter data collection range, is presented below (Table 1):

#Tweets	#EngrRanking	#Followers	#EngrRanking	#Photos & Videos	#EngrRanking	#Likes	#EngrRanking
7,467	WVU Statler College	4,895	Auburn CoE	1,129	WVU Statler College	3,323	WVU Statler College
6,905	Arkansas CoE	3,273	LSU CoE	1,076	K-State CoE	1,110	K-State CoE
4,126	LSU CoE	2,745	K-State CoE	600	Arkansas CoE	905	Tickle CoE
2,757	Auburn CoE	2,543	Arkansas CoE	560	Auburn CoE	870	Clemson CECAS
2,325	Tickle CoE	2,303	WVU Statler College	532	LSU CoE	784	Arkansas CoE
2,289	Bagley CoE	1,869	Bagley CoE	344	Clemson CECAS	532	LSU CoE
2,187	K-State CoE	1,441	Clemson CECAS	333	UNH CEPS	467	Auburn CoE
1,691	Clemson CECAS	1,231	UNH CEPS	310	Tickle CoE	403	UNH CEPS
1,687	UNH CEPS	1,182	Tickle CoE	159	Bagley CoE	99	Bagley CoE
431	OSU CEAT	423	OSU CEAT	153	OSU CEAT	1,869	OSU CEAT

Table 1 Overview of the Twitter data analytics for 10 CoEs as of August 30, 2017

Content analysis enabled the sorting of the selected CoEs Twitter media into four categories: *Innovative Courses/Projects*, *Research*, *Outreach*, and *Public Lectures*.

## Results

This section will include the presentation of the results of the Analytics and Content Analysis investigations.

### *CoE Twitter Analytics Data*

The analytics results for the Twitter media for the 10 CoEs, incorporating the Activity and Stakeholder Engagement indices, are presented below (Table 2). The data shows that the Statler College is the most active, based on the number of tweets, likes, and posted photos and videos, while Auburn CoE has the highest number of followers.

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Activity Index		Stakeholder Engagement Index	
#Tweets	#Photos & Videos	#Followers	#Likes
#1 WVU Statler College	#1 WVU Statler College	#1 Auburn CoE	#1 WVU Statler College
#2 Arkansas CoE	#2 K-State CoE	#2 LSU CoE	#2 K-State CoE
#3 LSU CoE	#3 Arkansas CoE	#3 K-State CoE	#3 Tickle CoE
#4 Auburn CoE	#4 Auburn CoE	#4 Arkansas CoE	#4 Clemson CECAS
#5 Tickle CoE	#5 LSU CoE	#5 WVU Statler College	#5 Arkansas CoE
#6 Bagley CoE	#6 Clemson CECAS	#6 Bagley CoE	#6 LSU CoE
#7 K-State CoE	#7 UNH CEPS	#7 Clemson CECAS	#7 Auburn CoE
#8 Clemson CECAS	#8 Tickle CoE	#8 UNH CEPS	#8 UNH CEPS
#9 UNH CEPS	#9 Bagley CoE	#9 Tickle CoE	#9 Bagley CoE
#10 OSU CEAT	#10 OSU CEAT	#10 OSU CEAT	#10 OSU CEAT

**Table 2** Twitter Data 10 CoEs as of August 30, 2017 as ranked by Activity and Engagement Indexes

**CoE Twitter Content Analyses Data**

As previously highlighted, the use of content analysis enabled the sorting of the Twitter data for the 10 CoEs into the following four categories: Innovative Courses/Projects, Research, Outreach, and Public Lectures. For the sake of brevity and because this study is exploratory, only the results for the University of Arkansas Engineering, Auburn Engineering, Clemson Engineering, and Oklahoma State Engineering are presented.

**Arkansas CoE:** The content analysis data (Table 3) for the University of Arkansas Engineering indicates that the most tweeted content (*Retweet: 10 | Likes: 16 | Comments: 1*) was a video showcasing *3D Printing*. Further, there is almost parity in the number of content featured across the categories of Innovative Projects, Research, and Outreach; although there is not as much Twitter content for Public Lectures.

Innovative Courses + Projects	Research	Outreach	Public Lectures
-Honors Innovation Course -Master's Collaboration with Honeywell -3d Printing Video -Lynda	-Poster Competition -Doctoral Project in Bangladesh Visiting Brazilian students present their research posters in the Union	-GiriTREC Camp -Dean English in Kansas City -Free Screening of Hidden Figures -K12 Outreach	NASA's Search for Our Origins (Honors College Alumna)

**Table 3** Content analysis for the Arkansas CoE Twitter feed as of August 30, 2017

**Auburn CoE:** Although the Research and Public Lectures categories of the Twitter feed (Table 4) for Auburn Engineering have sparse content, the *Graduate Engineering Research Showcase* was the most tweeted (*Retweets: 10 | Likes: 36*). Further, there is a substantial focus on Outreach programming.

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Innovative Courses + Projects	Research	Outreach	Public Lectures
-Mell Classroom -Total Eclipse Teaching Moment -Enki Notebooks -3D Printing -2018 service-learning projects to Bolivia, and Rwanda and thank you! #TigerGivingDay	-Graduate Engineering Research Showcase	-Robot Penthalon -2017 Women in Engr Camp -Grad Student_K12 Robotics -TigerTrek: Science & Engr Camp for Girls -Summer Enrichment Program -Young Alumni Council -Southwire Engineering Academy students -Auburn Engineering Magazine -Nanomaterial Character from Harry Potter -Cupola Engineering Ambassador	

**Table 4** Content analysis for the Auburn CoE Twitter feed as of August 30, 2017

**Clemson CoE:** The Twitter feed (Table 5) shows an overwhelming focus on research, including the posting of multimillion dollar research awards, of which there were five in the period under review. In contrast, there is no discernible content for Public Lectures. Interestingly, the most tweeted content (*Retweet: 11 | Likes: 49 | Comments: 2*) was the innovative K12 Outreach *Clemson Emagine* program.

Innovative Courses + Projects	Research	Outreach	Public Lectures
-Total Eclipse & Solar Panels -Fossil Free Challenge -Academic Advising Dashboard -Clemson Den	-\$6m Pharma Project--Female Prof. -\$2m Cultivate Project_Civil Engr -\$3m CyberSecurity Grant -Star Wars-like Laser Weapons -Clemson lands \$357M engineering grant -\$6m Brain Research -Animated Virtual Human study -Journal of Materials Science: Issue 9 is out!	-STEAM Exhibit -STEAM & EMagine -Robotic Arms (CA2VES)	

**Table 5** Content analysis for the Clemson CoE Twitter feed as of August 30, 2017

**Oklahoma State CoE:** The most tweeted content (*Retweets: 6 | Likes: 18 | Comments: 1*) was the partnership with the Oklahoma Department of Transportation, while the next two most tweeted were developments around *living/learning communities*. The Twitter feed (Table 6) is also active across all four categories, including several Public Lectures.

Innovative Courses + Projects	Research	Outreach	Public Lectures
-new living/learning program -Center for Local Government Technology (CLGT) has several training courses -From Research to App Competition -Partnership with ODOT -CEAT Student Development Series (Computer 101) Seminar_What's inside your computer and how to build a new one? -UnivWidePartnerships_Boy Scout Merit Badge University	-Interdisciplinary Research Panel -OSU Undergrad Research Symposium	-SpeedFest  -Hidden Figures -Support Engineers W/O Borders THIS WEEKEND! Tailgate  -2017 International Quarter Scale Tractor Competition  -Argonia Cup	-Dean's Building Leaders Initiative_Coach Boynton  -CLOUD Map_3D Mesonet in Oklahoma Colloquium Series  -Lecture: Migrant farmworker turned astronaut

**Table 6** Content analysis for the Oklahoma State CoE Twitter feed as of August 30, 2017

## Discussion/Conclusion

The objective of this exploratory, work in progress study was to focus on how selected CoEs in the Southeastern United States have used Twitter to promote research, teaching, and learning programs and to evaluate the subsequent engagement with these programs, using analytics data and content analysis.

The analytics data, operationalized with respect to Activity and Stakeholder Engagement indices, is presented below (Table 7) for the top three CoEs. Overall, the most active is Statler College, which also has the highest number of *#Likes*, while Auburn CoE has the most *#Followers*.

Activity Index		Stakeholder Engagement Index	
#Tweets	#Photos & Videos	#Followers	#Likes
#1 WVU Statler College	#1 WVU Statler College	#1 Auburn CoE	#1 WVU Statler College
#2 Arkansas CoE	#2 K-State CoE	#2 LSU CoE	#2 K-State CoE
#3 LSU CoE	#3 Arkansas CoE	#3 K-State CoE	#3 Tickle CoE

**Table 7** Data showing the top three most *active* and *engaging* CoE Twitter feeds

Similarly, content analysis indicates that the Clemson, Auburn, and Oklahoma State CoEs have the most innovative content across the categories of Research, Outreach, and Innovative Projects respectively.

There are other trends worth highlighting. The first is that only two (Auburn and Clemson CoEs) had defined innovative projects or programming for the recent Solar Eclipse, a cosmic science event which was watched by 215 million Americans<sup>9</sup>. The second is that Twitter provides a reliable microlearning platform to refute and clarify wrong data. For example, the most tweeted content overall for the Arkansas CoE (*Retweet: 121 | Likes: 188 | Comments: 4*) was the misidentification of a Arkansas CoE faculty member as a participant in the White supremacy event on the University of Virginia, Charlottesville, VA campus.

## Future Research

As this is a exploratory, work in progress study, future research will focus on the content analysis of the 10 selected CoEs in the Southeastern United States, which are peer institutions for the University of Arkansas. Another goal is to repeat this research exercise at the end of the 2017-2018 academic year, so that there is a two-year longitudinal dataset for benchmarking and data comparison.

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