The Effects of QR Code Prompts Posted to a Solar Charging Bench on Website Visibility

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Introduction: Paris Agreement

- 2015 United Nations Climate Change Conference in Paris, France
- Document recognizing need to cultivate sustainable future
- Goals and charges for each signatory nation to reduce their individual impacts on the environment
- United States administration withdrew their ratification on June 1st, 2017
  - Government agencies of one of the wealthiest countries ceasing to complete research on climate change
Introduction-Environmental Sustainability in a University Setting

- Universities in United States are a great place for sustainability research and action to be taken
  - History of large research universities with adequate funding to conduct research
  - Research still being conducted if government agencies are not doing it
- University-wide agreements to work towards improved sustainability
  - Talloires Declaration
  - STARS
Introduction-Environmental Sustainability in a University Setting

- Talloires Declaration
  - Created by *Association of University Leaders for a Sustainable Future (ULSF)*
  - Meeting to address the state of the world with 22 university presidents in Talloires, France led by then Tufts University President Jean Mayer
  - Published in October 1990, significantly before Paris Agreement
  - As of July 1st 2018, 504 institutions in 59 countries have signed
  - 10 point plan on how universities pledge to promote a sustainable future
  - Pledge rather than plan of action
  - (ULSF, 2015)
Introduction-Environmental Sustainability in a University Setting

- STARS
  - Association for the Advancement of Sustainability in Higher Education (AASHE)
  - Sustainability Tracking, Assessment & Rating System (STARS)
  - Universities can complete assessment and receive ratings: Reporter, Bronze, Silver, Gold, Platinum
  - Institutions can work towards credits and gain points towards rating
  - (AASHE, 2019)
Introduction- Sustainability Studies in a University Setting

- *Petersen, Shunturov, Platt, and Weinberger (2007)*
  - Dormitory residents reduce electricity consumption with feedback and incentives
  - Education on an issue combined with feedback would lead to behavior change
  - There was reduction, but specific behaviors not measurable

- *Binder (2012)*
  - Proper sorting behavior of trash and recycling using prompts, more salient bins, and different placement of receptacle
Introduction-Free Choice Learning

- Ballantyne & Packer (2005)
  - Free choice learning
  - Use of exhibits to challenge current perspectives about an issue
  - Can lead to desired sustainability outcomes such as inspiring curiosity about an issue
Introduction- QR Codes

- Lai, Chang, Li, Fan, & Wu (2013)
  - QR codes to increase mobile learning
  - Outdoor environment provides contextual experiences beyond the classroom
    - Related to content
- Gao, Liu, & Paas (2016)
  - Effort of QR code vs. manual selection
  - QR codes can be preferable to manual selection
    - Mixed results, but works with current study
  - Less effort required
Introduction - Barriers to Campus Sustainability

- *Horhota, Asman, Stratton, and Halfacre (2014)*
  - Identified four main behavioral barriers to campus sustainability
    - “Lack of engagement;
    - Communication issues;
    - Lack of proper campus infrastructure;
    - Financial concerns" (Horhota et al., 2014, p.346)
  - Current study aims to alleviate/address all barriers
The Current Study

- Placement of a solar charging bench on WMU campus using QR code graphic prompts in order to increase website traffic
- Aims to address all barriers mentioned by Horhota et al. (2014)
  - Lack of engagement
    - Placement of bench itself- high traffic, large salient bench, free-choice, low effort (QR)
  - Communication issues
    - Info-graphic prompt with instructions and QR code
  - Lack of proper campus infrastructure
    - Installation of bench
  - Financial concerns
    - Grant funded
Method- Participants and Setting

- **Participants**
  - Any users of solar bench,
  - Any users who scan QR code

- **Setting**
  - Installation site of Campus XL on WMU Campus (Figure 3)
  - During regular semesters (Fall or Spring)
Method- Apparatus and Materials

- Solar Charging Bench
  - Sunbolt company Campus XL model
  - Two 4’6” W x 1’ 2 ½” L Seats
  - 4’6” W x 3’6” L Table
  - Tilted solar canopy with 8’3 ½” high side and 6’11 ¾” low side clearance
  - 4’6” W x 7’0” L overall footprint
  - ADA Compliant (height/roll up)
    - 80”/ 83”

Figure 1. Campus XL measurement drawing depicting all exterior dimensions. Reprinted from the Sunbolt Installation and Operating Instructions (p. 21), by Sunbolt. (2018), Campus XL 2018 installation and operating instructions.
Sunbolt Campus XL

- Solar Work Station
- Supports up to 150 handheld mobile device charges per day
- Four 120v electrical receptacles
- Eight USB charging ports
- 90mph wind rating
- 25 year solar panel warranty
- Plug load monitoring system
Method - Apparatus and Materials

- QR Code Prompt
  - Developed for the purposes of the current study
  - 4” W x 6” L to fit on middle pillar of bench at eyesight
- QR code in upper right corner
  - Will take users to sustainability website
- QR code generated through qr-code-generator.com website

Figure 2. Graphic Prompt: 4.0” x 6.0” as it will appear on the Campus XL Bench. Developed for the current study by Brin Hamilton Photography and Design, (2019, February 11), Campus XL Info-Graphic [Digital image], Retrieved February 11, 2019.
Method- IV and DV

- DV
  - Change in website traffic monitored through general website hits and unique QR code URL
- IV
  - Installation of Campus XL and graphic prompts
Method - Experimental Design and Procedures

- **AB Design**
  - Generally limited due to no reversal
  - Could take away prompts but no complete reversal by taking away bench
  - Limitation alleviated through unique URL generated by QR code

- **Figure 3**
  - Installation site of solar bench
  - High foot traffic
  - Snow melt area

*Figure 3.* Bench Location: Red area indicated on image is the approximate location of the Campus XL bench on Western Michigan University Campus. Adapted from Google, (n.d.), *Western Michigan University*. Retrieved from https://www.google.com/maps/@42.2798848,-85.6154256,106m/data=!3m1!1e3
Method- Baseline and Intervention

- Baseline data collection
  - Data will be collected for two weeks
  - Data will be general website hits to sustainability website

- Installation of Bench and prompt
  - Data will be collected for two weeks and evaluated
  - Data will be general website hits (from prompt and not) and specific hits generated by prompt
Potential Results

- Expected results
  - With implementation of solar bench and QR code prompt, website usage will increase
Implications

- More benches
  - New south neighborhood
  - Facilities interested
  - University mainframe

- Spread visibility
  - WMU has pockets of sustainability (Sangren, Solar Farm)
  - Will make WMU an overall ‘greener’ campus

- Student research
  - Ability of undergraduate students to participate in data collection and use bench(es) for further projects
Future Research

- Not as expected results
  - Changes to prompt can be made
    - Placement
    - Color
    - Wording

- Expansion of prompt
  - Demographics
  - Visual feedback
Conclusion

- Large implications on visibility of sustainable actions at WMU
- Outlook on saliency of bench
- How well barriers were addressed
- Open door for more benches
References

- Google, (n.d.). Western Michigan University. Retrieved from https://www.google.com/maps/@42.2798848,-85.6154256,106m/data=!3m1!1e3