Student Perceptions of Solar Energy: A Study at Two Southern US Research Universities.

Benita Komunjeru

Louisiana State University

Department of Agricultural Extension Education

& Evaluation

225 JC Miller Hall, Baton Rouge, LA, 70803

Bkomun2@lsu.edu/ Bkomunjeru@agcenter.lsu.edu

Dr. William Richardson

Louisiana State University

Department of Agricultural Extension Education

& Evaluation

Baton Rouge, LA, 70803

brichardson@agcenter.lsu.edu

Dr. Micheal F.Burnett

Louisiana State University

Department of Agricultural Extension Education

& Evaluation

Baton Rouge, LA, 70803

vocbur@lsu.edu

Introduction

Extensive research shows that solar energy has broad public support globally and nationally, with 70–80% positive sentiment (Nuortimo et al., 2024; Carlisle et al., 2015; Pew Research Center, 2024). However, one-third of Americans believe solar farms would help their community economically while many remain unsure, and barriers including up-front costs, regulatory challenges, and aesthetic concerns persist (Badole et al., 2024; IRENA, 2019; Pew Research Center, 2024; U.S. Department of Energy, 2021).

On the other hand, solar energy adoption willingness varies significantly across demographic groups, with age, education, and rural versus urban residence serving as key predictors (Badole et al., 2024; Brambati et al., 2022; Osei et al., 2025; Pew Research Center, 2024). These demographic patterns are particularly pronounced regionally, with Southern and rural Americans less likely than urban peers to see local solar as economically beneficial and expressing greater landscape aesthetic concerns (Pew Research Center, 2024). This regional skepticism contrasts with younger adults and university students, who are more favorable toward solar projects and emphasize local economic and environmental benefits (Solomon et al., 2025; Pew Research Center, 2024). Understanding what drives these contrasting attitudes becomes crucial, as knowledge, information and awareness emerge as the strongest driver of solar acceptance across all demographic groups, even more than economic variables (Osei et al., 2025). Furthermore, research indicates college environments foster the development of students who go on to influence social and environmental practices (Pizmony-Levy, 2022), with pro-environmental behavior increasing significantly during college years (Meyer, 2015). Therefore, as these students transition into roles as homeowners and community leaders, their current solar energy knowledge and attitudes may influence future regional adoption patterns.

Given the importance of knowledge in shaping solar attitudes and the documented contrast between regional and student populations, substantial gaps remain regarding student-specific solar energy knowledge and attitudes, especially among Southern U.S. university students. The purpose of this study is to describe solar energy knowledge and beliefs among college students and compare solar technology familiarity between Louisiana State University and Southern University students.

Conceptual Framework

This study employs the Theory of Planned Behavior (TPB), developed by Icek Ajzen in 1991. TPB proposes that behavioral intention is predicted by three key constructs: attitude toward the behavior (positive or negative), subjective norms (perceived social pressure from others), and perceived behavioral control (perceived ease or difficulty of performing the behavior). This framework aligns well with the study purpose, as solar energy knowledge contributes to attitude formation toward solar technology, cost beliefs directly influence attitudes through economic evaluations of solar adoption, and technology familiarity relates to perceived behavioral control over solar energy use.

Methods

This study employed a cross-sectional descriptive research design to examine college students' solar energy knowledge, beliefs, and technology familiarity with solar energy. A convenience sample of undergraduate students was recruited from both Louisiana State

University (LSU) and Southern University (SU) institutions during spring 2024. Data were collected using a structured questionnaire that included measures of demographics, solar energy awareness, cost beliefs, and technology acceptance. Validity of the instrument was established through extensive literature and expert review while traditional internal consistency reliability measures were not applicable because the survey items were single binary (yes/no) measures assessing familiarity and awareness. The survey was administered in-person where students scanned a QR code with informed consent.

Results

A total of 310 students participated in the study, 175 LSU, 130 SU, 5 other universities. Participants were 59% female, 31% male, with 38% from rural communities, 55% urban and 5% suburban communities.

Descriptive analysis revealed varying levels of familiarity with solar energy terminology among participants. The majority of students (95%, $n = 295$) reported familiarity with the term "renewable energy," while substantially fewer were familiar with more technical terms such as "photovoltaic power stations" (9%, $n = 28$) and "agrivoltaics" (6%, $n = 20$).

When asked about solar energy costs relative to fossil fuels, 30% ($n = 92$) of students believed solar power costs more, 53% ($n = 163$) believed it costs less, and 15% ($n = 45$) believed costs are equivalent. Regarding technology acceptance, 45% ($n = 140$) of participants indicated willingness to consent to a solar farm installation on or adjacent to their property.

An independent samples t-test was conducted to compare solar technology familiarity scores between LSU and SU students ($N = 305$, excluding 5 students from other universities). LSU students demonstrated significantly higher familiarity with "solar farm" terminology ($M = 1.86$, $SD = .34$) compared to SU students ($M = 1.55$, $SD = .50$), $t(282) = 6.31$, $p < .001$, Cohen's $d = .76$, and were more likely to have seen a solar farm (LSU: $M = 1.52$, $SD = .50$; SU: $M = 1.23$, $SD = .42$), $t(281) = 5.13$, $p < .001$, Cohen's $d = .62$. These medium-to-large effect sizes indicate meaningful practical differences between institutions. No significant differences were found for other technical terminology familiarity such as photovoltaic and agrivoltaics.

Conclusion, Implications, Recommendations

This study revealed significant knowledge gaps among Louisiana college students regarding solar energy technology, despite general renewable energy familiarity and optimistic cost beliefs. LSU students demonstrated greater familiarity with solar farm terminology and direct exposure to solar installations compared to SU students, though both institutions showed similarly low technical knowledge of specialized terms like agrivoltaics and photovoltaics. Additionally, the results showed that while students hold positive economic perceptions that could facilitate adoption, limited technical knowledge may constrain widespread acceptance. Therefore, we recommend that universities develop targeted educational programs addressing technical solar terminology and integrate renewable energy components into curricula, with particular emphasis on providing direct exposure opportunities through campus demonstrations and field experiences.

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