



# A NSF-REU Program with International Undergraduate Research as a Setting for Transformative Learning



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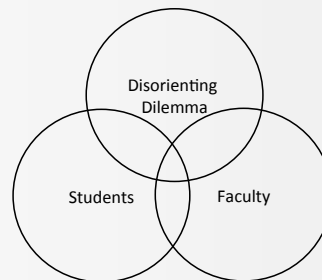
## SUMMARY

Transformative learning involves rational critical reflection and emotional experiences that alters student psychological, convictional, and behavioral perspectives. This ultimately helps shape their own self-concept about their place in science. Our program in the Republic of Turkey provides participants with essential elements of transformative learning; disorienting dilemma, educator assistance, and a supportive environment for learning. Our international research program studies the phenomenon of biological invasion through integrative studies of a model study organism, the honey bee (*Apis mellifera* L.). Many studies of invasive species focus on invasive populations, ours focuses on native populations as part of an ongoing paradigm shift in the field. The international research setting, with its culture and language foreign to students, provides a disorienting dilemma that emotionally triggers students to reconsider core beliefs and their bases. Structured experiences in the REU program promote rational critical reflection of beliefs and their bases. Faculty from the USA and Turkey collaborate to guide students in research and their re-examination of their own self-concept. Students develop a supportive environment for discourse with one another about careers and their professional and personal interests. While transformative learning is ultimately a personal and individualized experience, we feel international research settings provide exceptional opportunities for transformative learning.

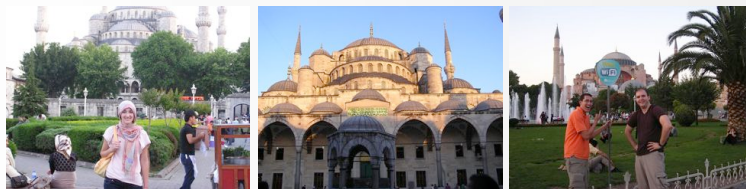
### The Transformative Learning Model

Transformative learning (the intersection of all three circles) results from specific psychosocial interactions among students and faculty under conditions that create a disorienting dilemma for learners.

- **Disorienting dilemmas** stimulate the learner to question core beliefs and their underlying assumptions (having areas of intersection with students and faculty).
- **Faculty** are educators with experience to facilitate discussions of critical assumptions and autonomous thinking (area of intersection between student and faculty).
- **Students** collaborate in their own learning, establishing a safe environment in which they can openly and responsibly critique assumptions of their current beliefs and discover alternate points of view.



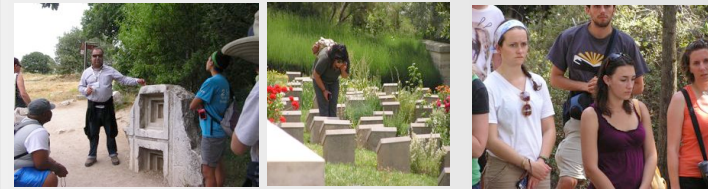
### The International Research Environment: A Disorienting Dilemma



We believe international research experiences provide major life transitions for students, creating an emotional and rational context for altering their perspectives.

- **Cultural differences** stimulate the learner to question norms for dress, appearance, and behavior (top left).
- **Religious differences** stimulate the learner to question underlying source of early knowledge and culture (top middle).
- **Familiar culture** is not easily available because communication is limited.
- **Communication** in the research environment and culture relies on learning new languages.

### Cultural Experiences and a REU Mini-Course Guide Questioning of Core Beliefs



A mini-course in the USA before leaving the country and cultural experiences in the first days after arrival in the Republic of Turkey guide students through initial stages of examining core beliefs about science and culture.

- **Mini-Course** stimulates the students to consider their understanding of science as a process. Each faculty member presents their research and engages students in discourse on experimental design and techniques.
- **Ancient Turkey** is represented by numerous sites visited by students, such as the archaeological sites of Troy (left). This stimulates thinking about a cultural history much deeper and closer to the roots of humanity than most have known previously.
- **Modern Turkey** is introduced through the lens of the events of World War I on the Gallipoli Peninsula (middle and right). This helps students understand how modern Turkey developed a secular government following the Ottoman Empire.
- **Journaling** is taught in the REU mini-course as a means of reflecting upon and recording experiences. This promotes the rational critical reflection that is the basis of transformative learning.

### Faculty are Facilitators of Students



U.S. and Turkish faculty collaborate to guide students in essential techniques and theory underlying activities. Scientific and cultural discussions invite students to consider how previous knowledge and beliefs can be reconciled with new experiences in this new environment. Students each develop their own understanding of how these experiences will mold their own self-concept.



### Students Establish A Respectful and Civil Environment Supportive Of Autonomous Thinking



Whether "goofing" at historical sites (left) or working through small triumphs like catching their first bee (right), students live together in close living quarters for two months. They develop a supportive environment in which they discuss core beliefs about careers and culture, with mutual respect for one another's ideas.



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