



FIG Working Week 2024

19-24 May

Accra, Ghana

Your World, Our World:
Resilient Environment
and Sustainable
Resource Management
for All

Presented at the FIG Working Week 2024,
19-24 May 2024 in Accra, Ghana

Embracing Robotics and Artificial Intelligence in Land Surveying Education

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INTRODUCTION

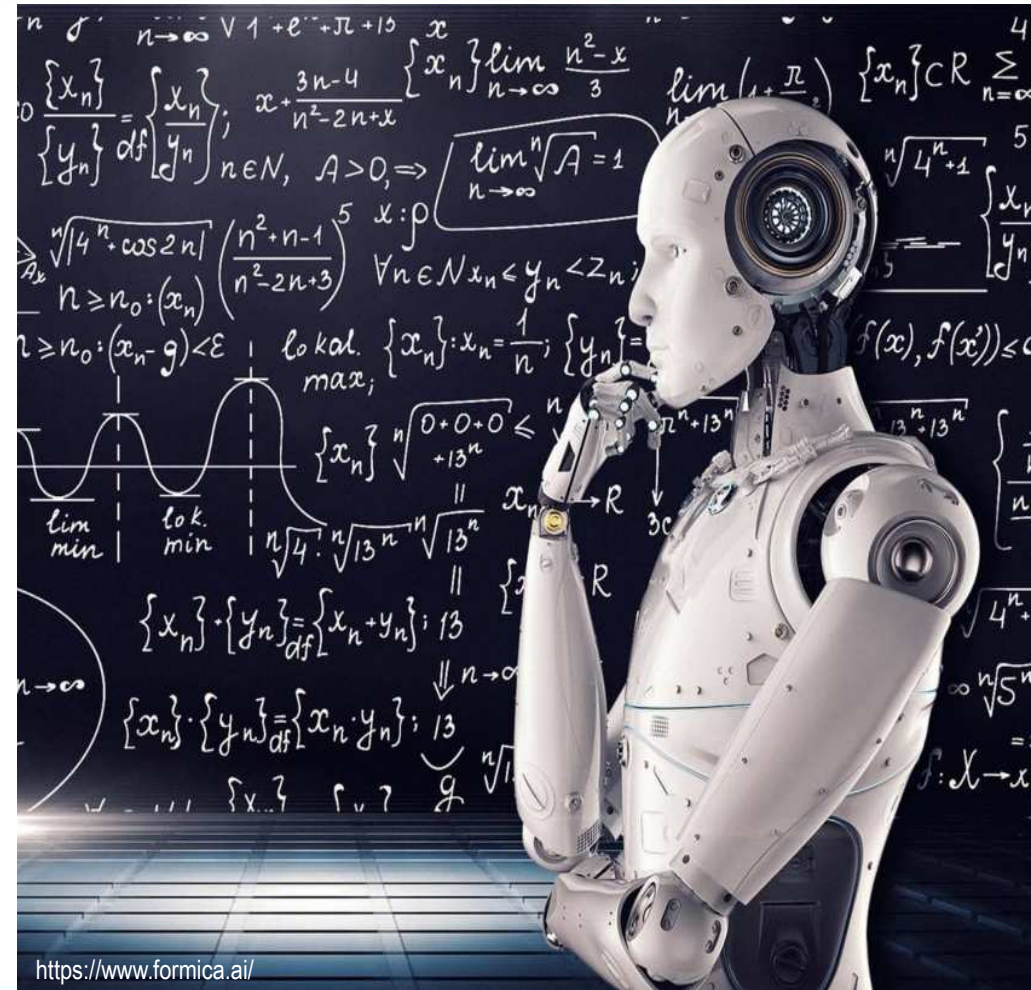
Acceptance of robotics and artificial intelligence in land surveying education is essential to adapt our curriculums and practices into the transformed century.

Technology systems have downsized creating an incentive to the education community due to affordability.

Challenges have introduced educational paradigms due to euphoric and technology-accelerated changes.

Pedagogical approaches are freed from methods that are anchored in the learner's approach, instead is mostly based on access to resources without constraints.

The new and unprecedented era has transformed into becoming a fully active on the path of innovation.



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LEARNING FOUNDATION

Learning Process by Confusio

When I hear, I forget;

When I see, I remember,

When I do, I learn.



<https://pixabay.com/illustrations/see-listen-talk-group-not-hear-1019991/>



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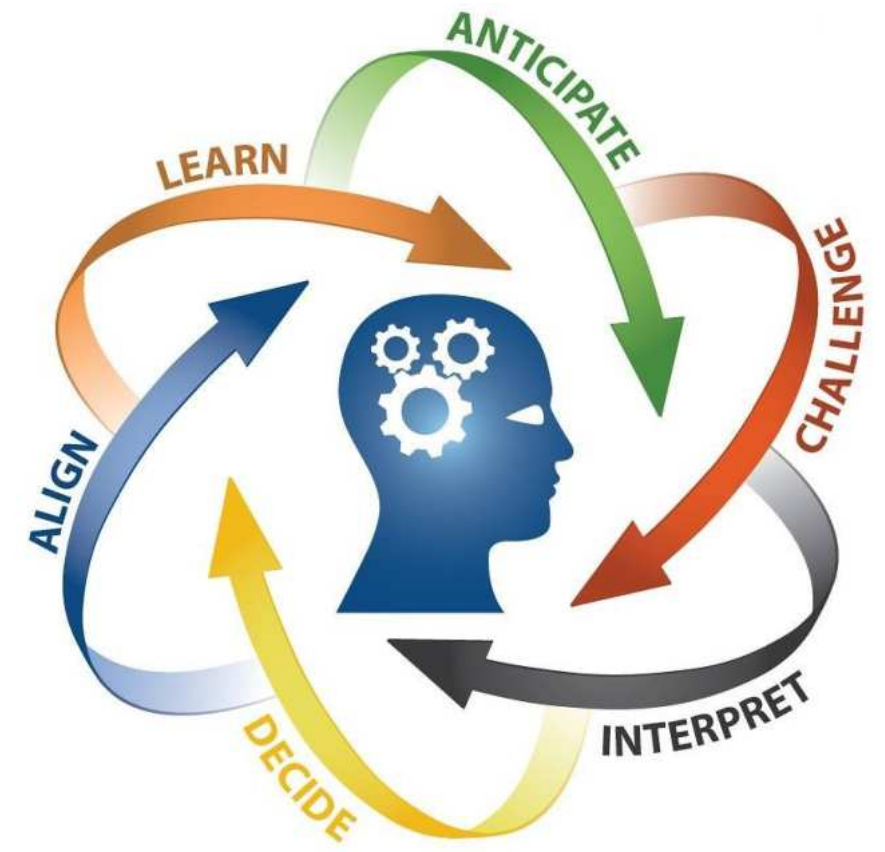
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LEARNING FOUNDATION REALITIES

1. Apprentices don't learn exactly what it's been instructed.
2. A learner's ability to learn is determined by:
Natural ability,
Background,
Pairing Style (Apprentice and Facilitator)
3. Facilitators can't do anything about the learner's ability, although they can be guided them to maximize the similarity of their styles to their facilitator.



<http://www.illuminatedlv.com>



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LEARNING FOUNDATION by BLOOMS TAXONOMY

Blooms Taxonomy

A good facilitator is the one who:
uses himself as a bridge,
invites his learners to cross over it
and although the bridge might
collapse later,
reinforces all the apprentices who
experience the process to build their
own bridges.

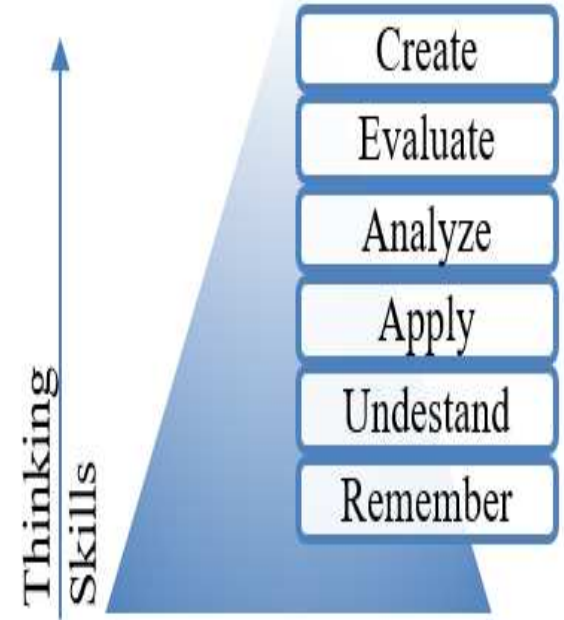


Figure 1. Blooms Taxonomy (Bloom, 1984)



<https://www.cntraveler.com/>



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LEARNING STYLES

- Accomodating learners
Combine activist and pragmatic techniques
- Diverging learners
Combine activist and reflective techniques
- Assimilating learners
Combine reflective and theorist techniques
- Converging learners
Combine theorist with pragmatic techniques

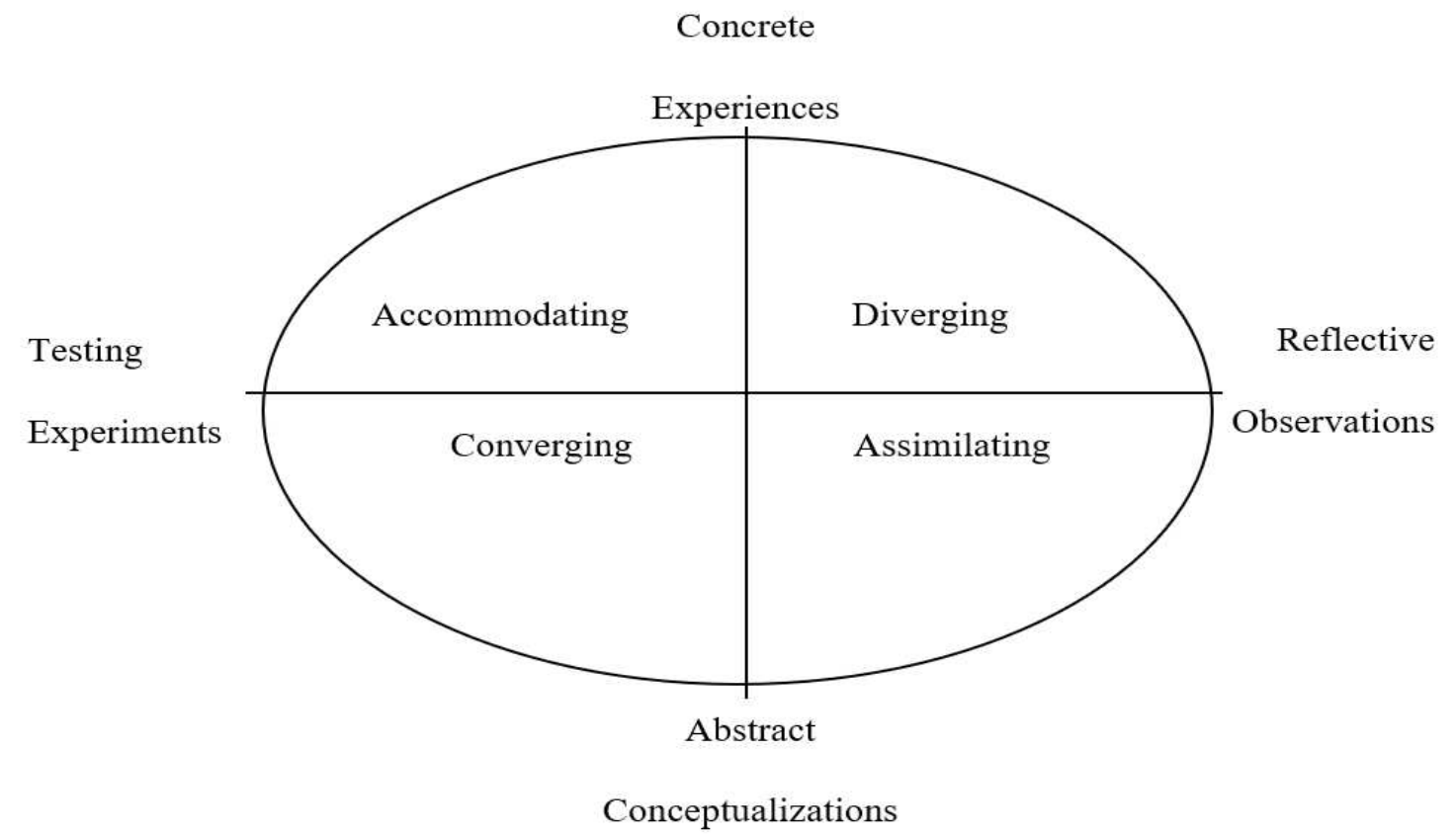


Figure 2. Learning Process Model by David Kolb (Honey and Mumford, 1986).



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LEARNING STYLES INVENTORY

Instructions: It will take 30-45 minutes to complete the Learning Style Inventory and develop your Learning Style Profiles. As you complete the Learning Style Inventory remember that there are no right or wrong answers. The Inventory gives you an idea of *how* you learn; it does not evaluate your learning ability.

- Rank order each set of four words (going across) in the 10 items listed below. Assign a 4 to the word which *best* characterizes your learning style, a 3 to the next best, a 2 to the next, and a 1 to the *least* characteristic word. Assign a different number to each of the four words. *Do not make ties.*

- | | | | |
|--------------------------------|-----------------|-----------------------|---------------------|
| 1. ___ involved | ___ tentative | ___ discriminating | ___ practical |
| 2. ___ receptive | ___ impartial | ___ analytical | ___ relevant |
| 3. ___ feeling | ___ watching | ___ thinking | ___ doing |
| 4. ___ accepting | ___ aware | ___ evaluating | ___ risk-taker |
| 5. ___ intuitive | ___ questioning | ___ logical | ___ productive |
| 6. ___ concrete | ___ observing | ___ abstract | ___ active |
| 7. ___ present-oriented | ___ reflecting | ___ future-oriented | ___ practical |
| 8. ___ open to new experiences | ___ perceptive | ___ intelligent | ___ competent |
| 9. ___ experience | ___ observation | ___ conceptualization | ___ experimentation |
| 10. ___ intense | ___ reserve | ___ rational | ___ responsible |

(for scoring only) ___ (CE) ___ (RO) ___ (AC) ___ (AE)

- Total the rank numbers you have given to the ten words in each of the four columns (add all of your scores going down). The sum of the first column gives you your score on **CE: Concrete Experience**; the second column gives you your score on **RO: Reflective Observation**; your score on the third column is for **AC: Abstract Conceptualization**; and the fourth column is your score on **AE: Active Experimentation**.
- Transfer each of your scores to the Learning Style Profile on the next page by placing a mark by the number you scores on each of the four dimensions. Connect these four marks with straight lines.

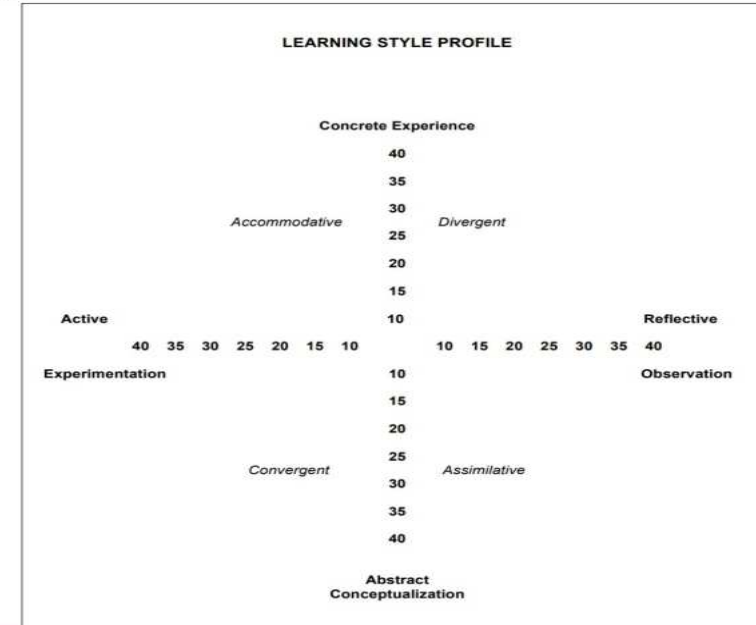




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LEARNING STYLES INVENTORY 2011

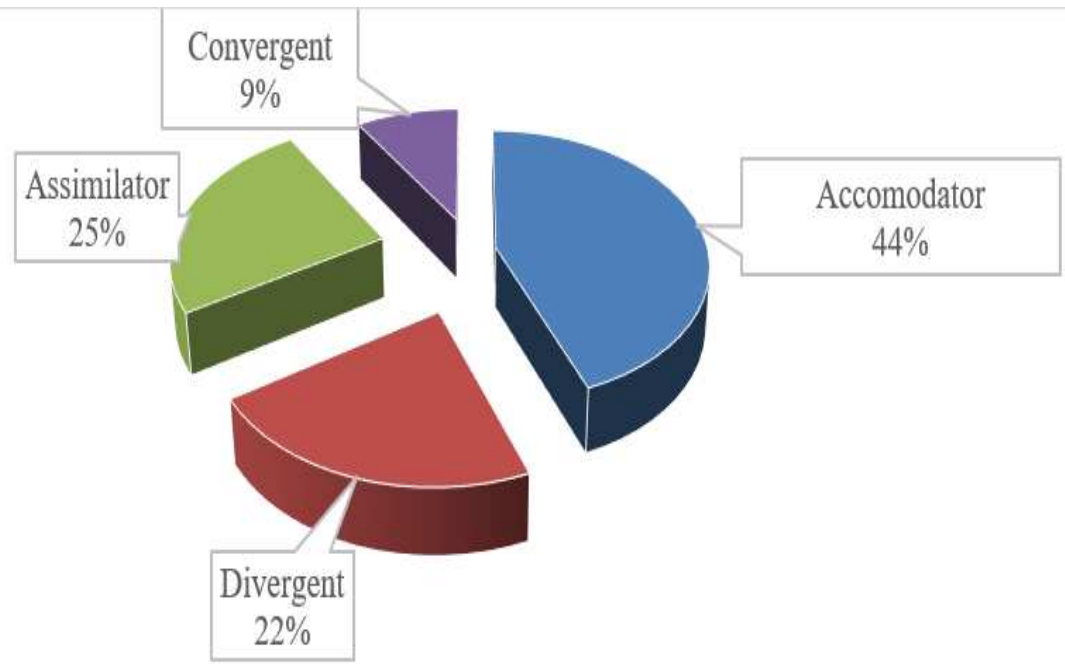


Figure 3. Distribution of 2010 Learning Styles of the Civil Engineering and Surveying Programs at the University of Puerto Rico (De La Rosa, 2011).

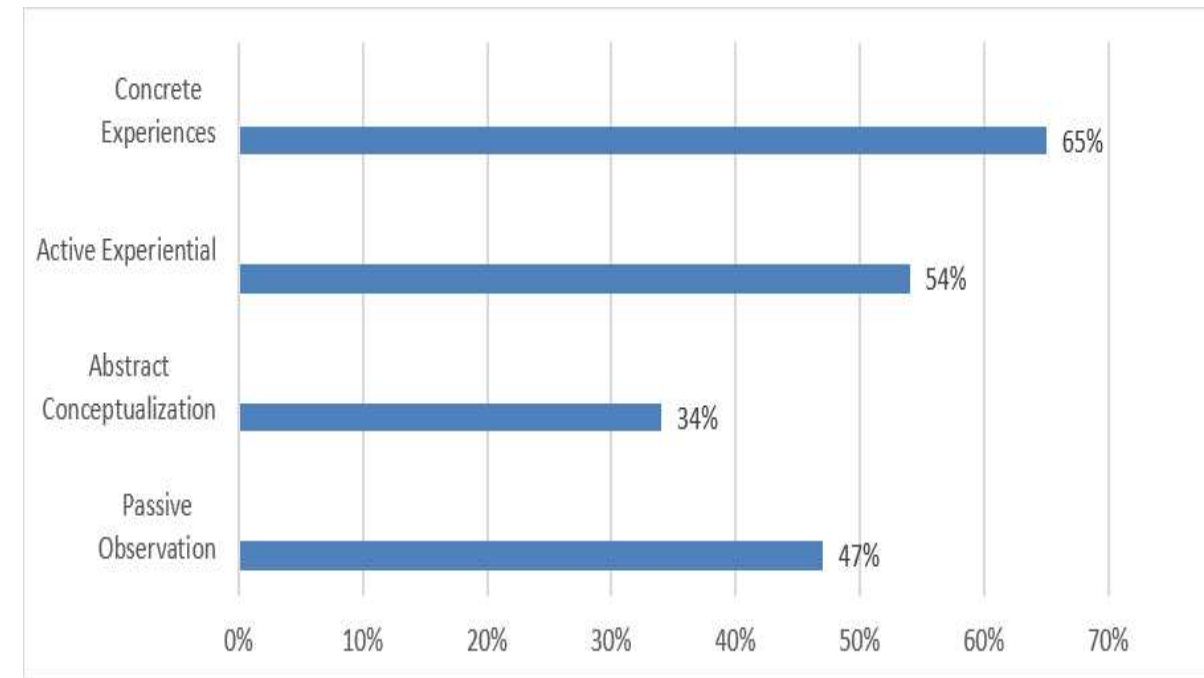


Figure 4. Distribution of 2010 Learning Processes of the Civil Engineering and Surveying Programs at the University of Puerto Rico (De La Rosa, 2011).



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LEARNING STYLES INVENTORY 2023

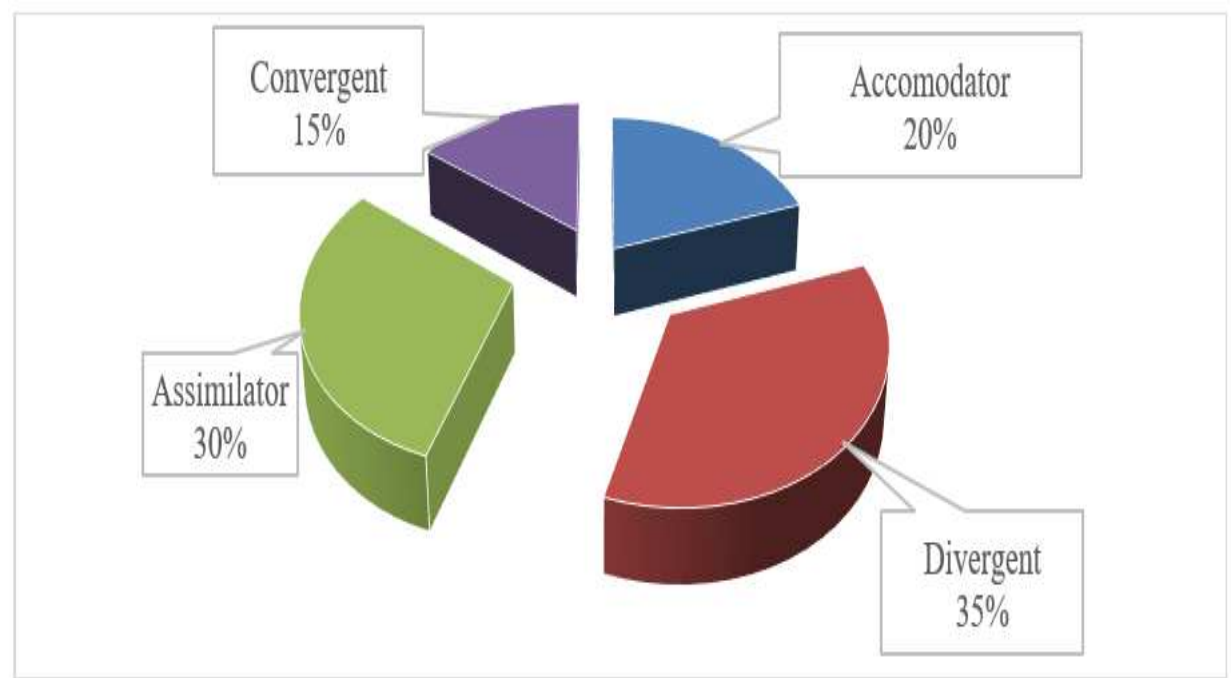


Figure 5. Distribution of 2023 Learning Styles of the Civil Engineering and Surveying Programs at the University of Puerto Rico.

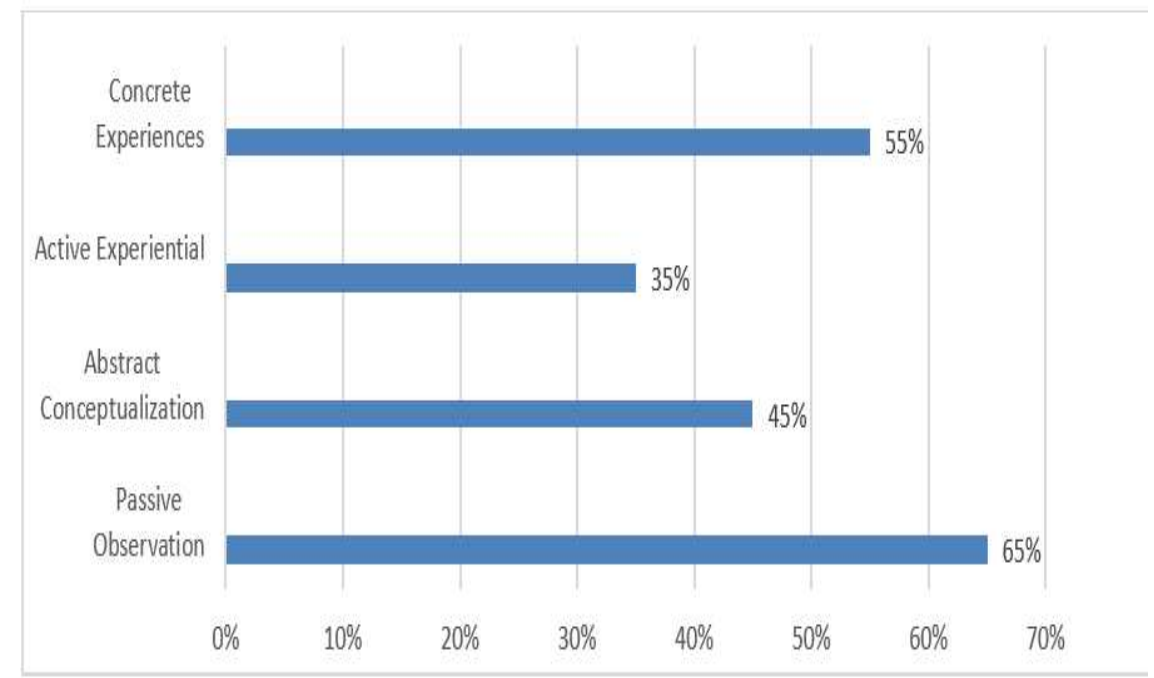


Figure 6. Distribution of 2023 Learning Processes of the Civil Engineering and Surveying Programs at the University of Puerto Rico.



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LEARNING FOUNDATION CLASSIFICATION

Concrete experiences:

Immediate human situations

Personal ways

Feeling more than thinking

Authenticity and complexity

Unstructured and personal

Guided by intuition rather

than stipulated systems

or arrangements.



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Passive Observations:

- Understanding the meaning of things, ideas, and situations

- Unbiased descriptions

- How and why of things before application

- Patience, impartiality, and sound judgment

- Incredibly good analyses conducted

- Consider various implications

of specific situations.



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LEARNING MODELS 2011

Documenting the Dimensions



Outdoor Experiences





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LEARNING MODELS 2023

Automated Topography - AI

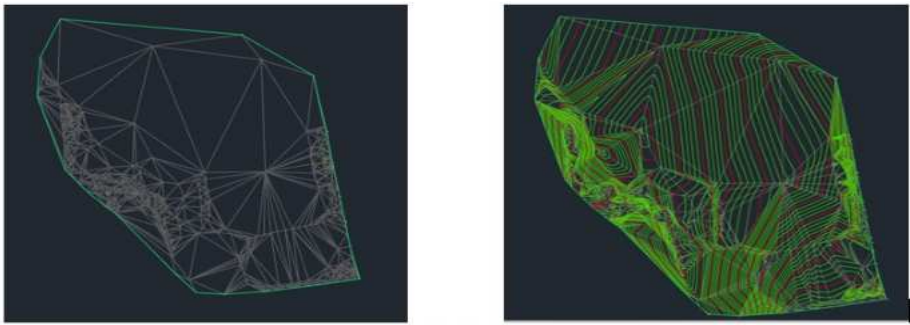
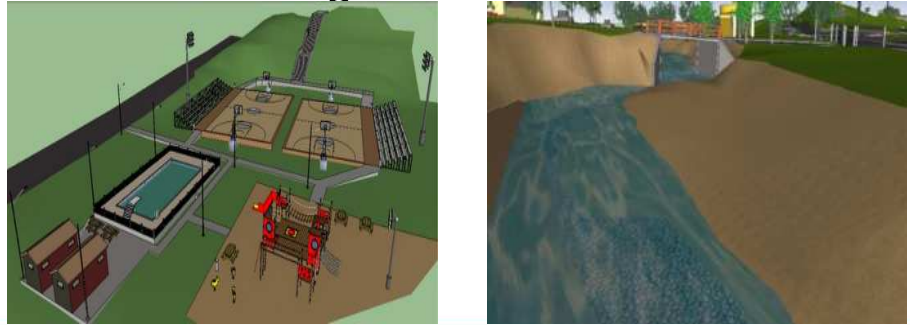
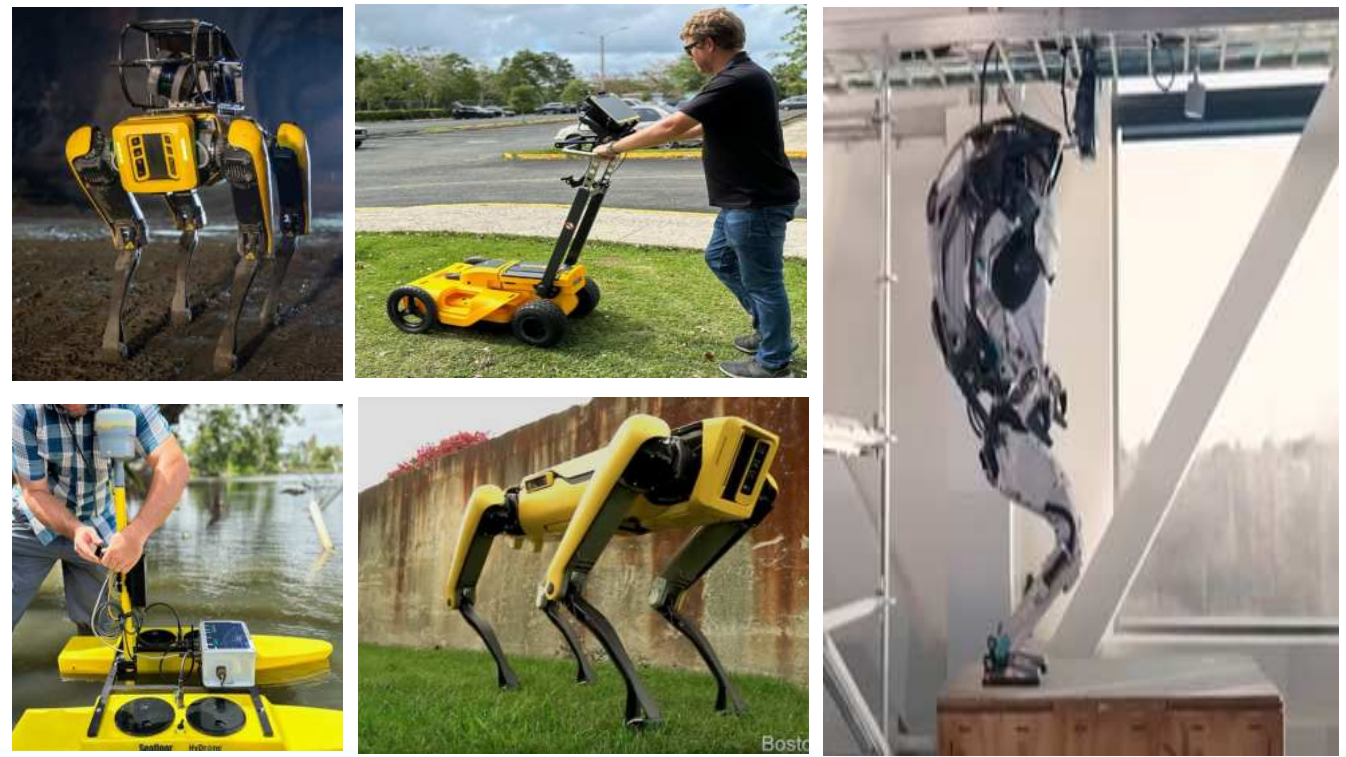


Figure 10. Automated TIN and Topography Model.

Automated Design - AI



Robotics



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LEARNING EXPERIENCES

Occurs in cycles.

Responsibilities of a good facilitator:

provide mechanisms for all learning styles

combine opportunities for all styles with the immersion of robotics and artificial intelligence.



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CONCLUSIONS

Be the **Bridge** that the learners will use to cross and then build their own bridges

Adopt **Lifelong Learning** vision with robotics and artificial intelligence to engage the learner as a high quality learner to be prepared to meet the industry with strong abilities to diversify.



<https://www.createmarket.com/>



<https://www.civilgeeks.com/>



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Thanks for your Attention



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