

# Measure of Intuition role when solving Math & Scientific Problems

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# INTRODUCTION:

**INTUITION** GENERALLY REFERS TO A BRAIN PROCESS THAT GIVES PEOPLE THE ABILITY TO MAKE DECISIONS WITHOUT THE USE OF ANALYTICAL REASONING, THE RESEARCHERS SUGGEST. INTUITION CAN BE THOUGHT OF AS INSIGHT THAT ARISES SPONTANEOUSLY WITHOUT CONSCIOUS REASONING, DANIEL KAHNEMAN.

WHEN THIS TRAINED PERSON GIVES THE RIGHT ANSWER OR SOLUTION TO A PROBLEM, AND ASKED ABOUT HIS/HER DECISION PROCESS, THE RESPONSE CAN BE BASED ON LOGIC OR IN SOME CASES MAYBE IS BASED ON GUT FEELING OR MIX OF BOTH.

**THIS WORK IS ABOUT** UNDERSTANDING THE LINK BETWEEN THE STUDENT USE OF INTUITION IN MATH AND SCIENCE IN THEIR SUCCESS IN BOTH SUBJECTS/COURSES.



# THE SCOPE OF THE STUDY:

AS A START, I AM TARGETING MY SPRING 2020 UNDERGRADUATE STUDENTS WHO ARE TAKING ASTRONOMY OR PHYSICS.

I USE DR. LAUREN A. CARLSON QUESTIONS SURVEY THAT ARE AVAILABLE IN HER PUBLISHED PAPER, "VALIDATION OF A MEASURE OF AFFECTIVE, INFERENCEAL, AND HOLISTIC INTUITION".

HOWEVER, I MADE SOME ADJUSTMENTS ON THE QUESTIONS:

- a) **WHEN USING HER 37 QUESTIONS, I ADDED AN ADDITIONAL STATEMENT "WHEN SOLVING MATH OR SCIENCE PROBLEM" TO EACH QUESTION SO THE PARTICIPANT'S ANSWERS ARE SPECIFIC TO IMPLEMENT INTUITION ONLY WHEN HE OR SHE IS DEALING WITH MATH OR SCIENCE PROBLEM OR BOTH.**
- b) **IN ADDITION TO THE ORIGINAL 37 QUESTIONS SHE HAS IN HER PAPER, FIVE MORE QUESTIONS ADDED TO INCLUDE THE INFLUENCE OF WORKING WITH A GROUP ON ENHANCING THE STUDENT INTUITION TAPPING WHEN SOLVING MATH/SCIENCE PROBLEM(S).**



# The Method and Procedure of the study

The group of this study are my undergraduate students consisting of science and non-science majors. The students are taking the following intro courses:

1- Astronomy 1345: Most students are non-science majors (business)

# participants =71

2- Physics 1351: Most of the students are Science, math majors (or engineers)

# participants =13

3- Science 3304: Most of the students are in Education school.

# participants =67

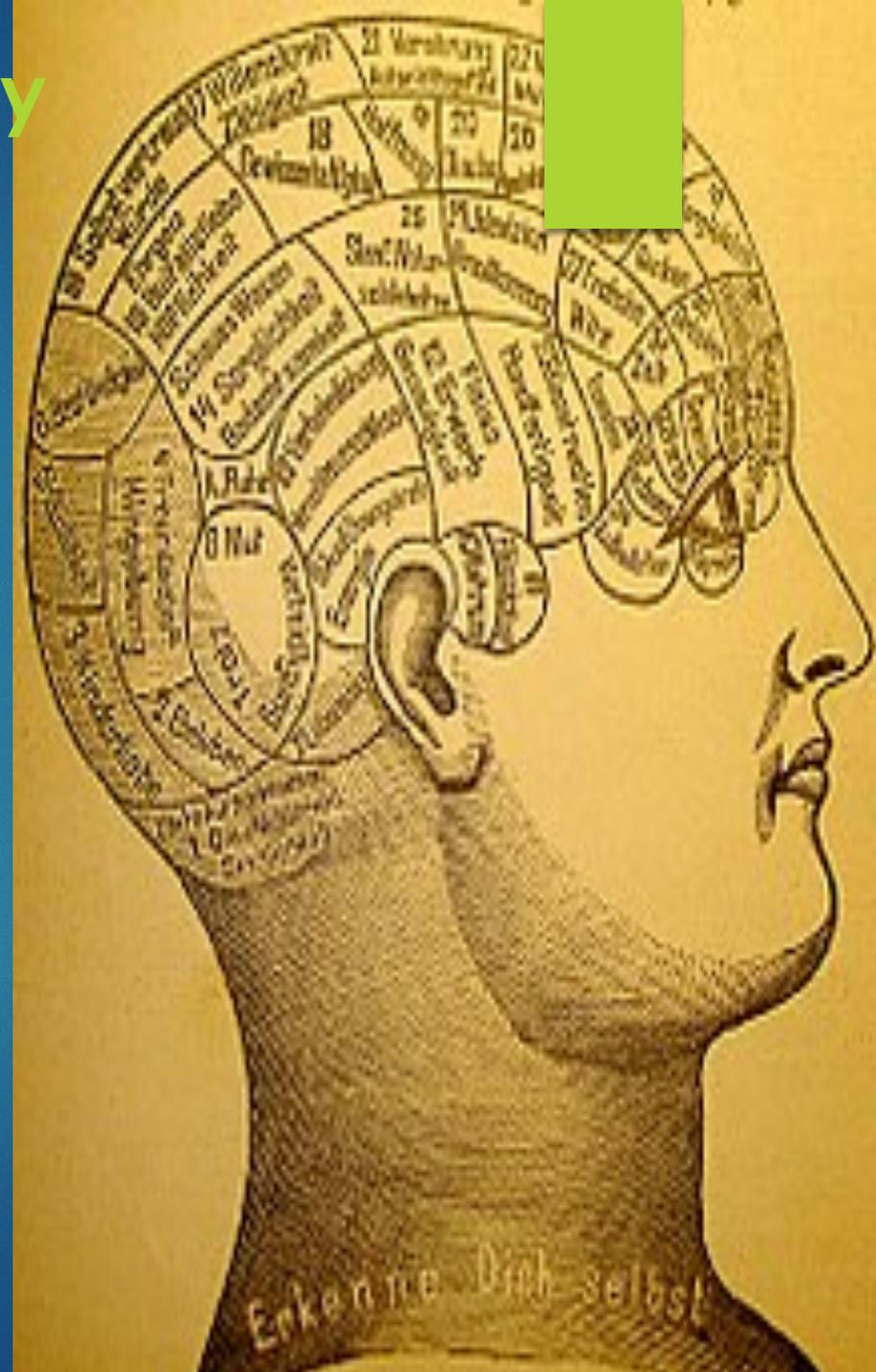
**The survey consists on one set of questions, 42 total. Each question is rated from 0 -5.**

**I have divided the whole set into three parts so the participants wouldn't have a mental exhaustion answering all 42 questions in one session.**

**The survey will be administrated electronically in three phases.**

**The three parts, can be done in one session if the participant chooses to.**

**All three parts of the survey will be available for at least one week from the first day of opening the survey.**



## THE QUESTIONS FOR PHASE#3:

I AM DISCUSSING THE LAST PART OF THE SURVEY' QUESTIONS (PHASE#3).

IT INCLUDES THE USE OF THE INTUITION IN GENERAL, AND WHILE WORKING WITH A GROUP:

**Q1:** I believe in trusting my hunches solving math/science problem.

**Q2:** Even after I have a specific plan for solving a Math /science problem, I make an effort to remain open to other approaches.

**Q3:** In a familiar area, I am comfortable deciding based on limited information when I must.

**Q4:** I rarely allow my emotional reactions to override logic

**Q5:** When making decisions in Math/Science, I try to suspend my assumptions and prior beliefs.

**Q6:** I am more likely to trust my intuition on complex Math and science problems than simpler ones.

**Q7:** There is a logical justification for most of my intuitive judgments.

**Q8:** I almost always trust my intuition solving Math/Science problem because I think it is a bad idea to analyze everything.

**Q9:** Intuition is an accurate and reliable shortcut for Math /science problems that would otherwise require a lot of analyses.

**Q10:** I like to rely on my intuitive impressions when working with a group.

**Q11:** I like to rely on my logic thinking when working with a group.

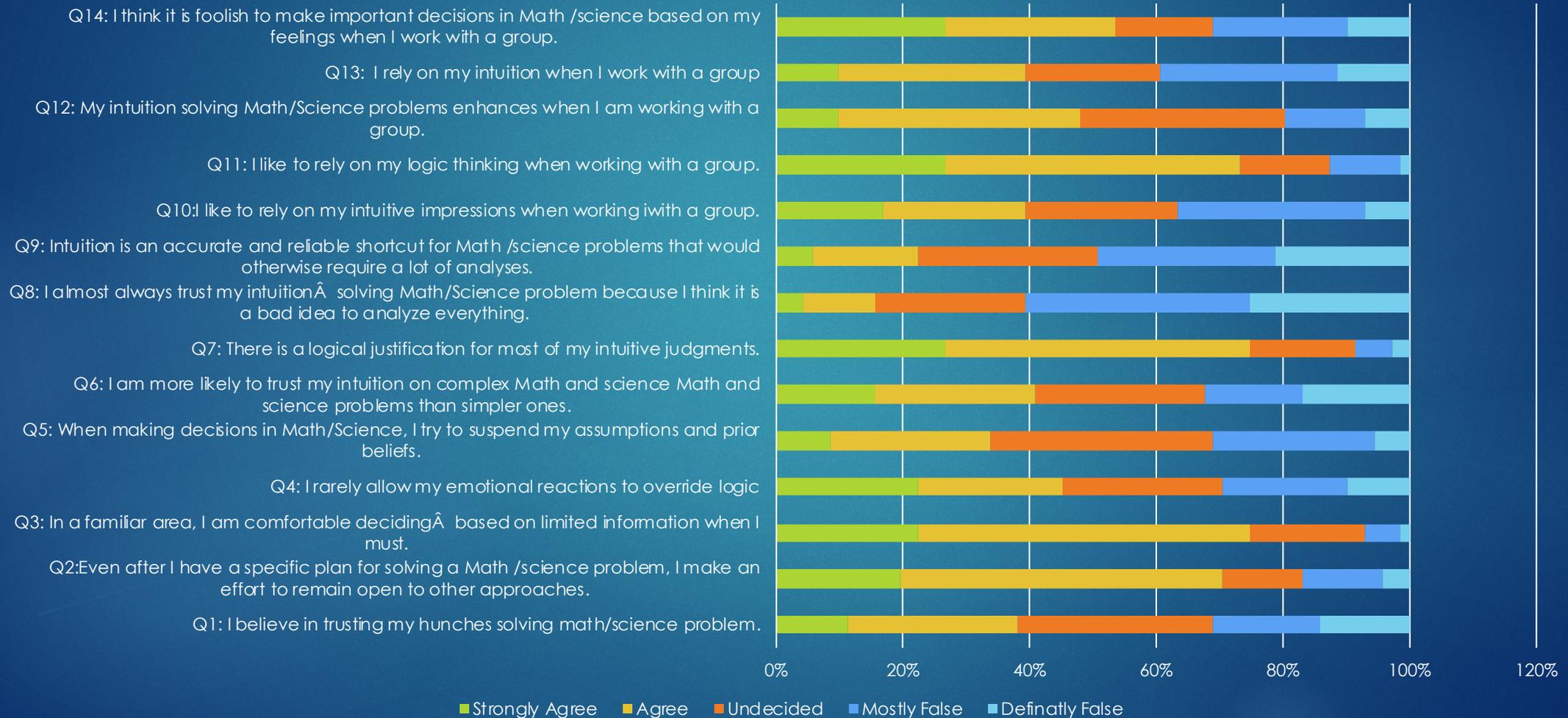
**Q12:** My intuition solving Math/Science problems enhances when I am working with a group.

**Q13:** I rely on my intuition when I work with a group

**Q14:** I think it is foolish to make important decisions in Math /science based on my feelings when I work with a group.

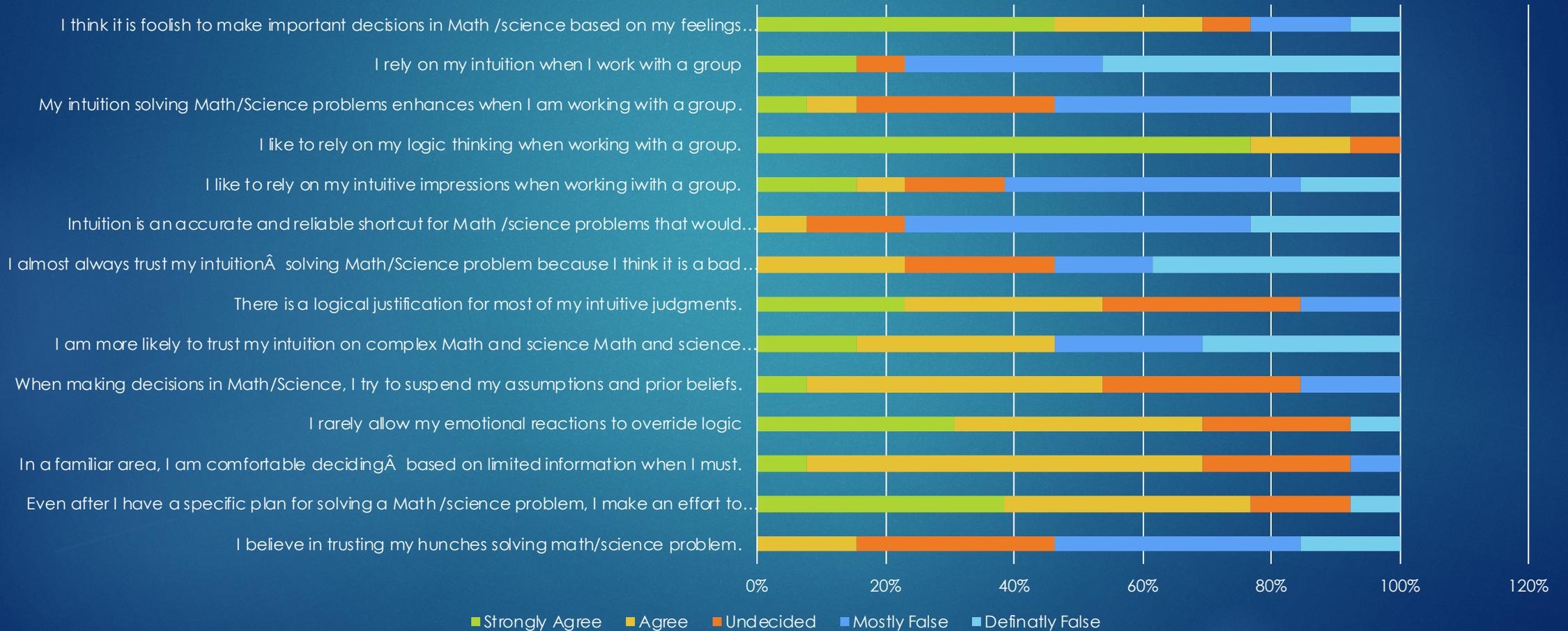
# GRAPHS

## Astronomy 1345 Students Phase#3 #Participants=71 Non-Science =99%- Science = 1%



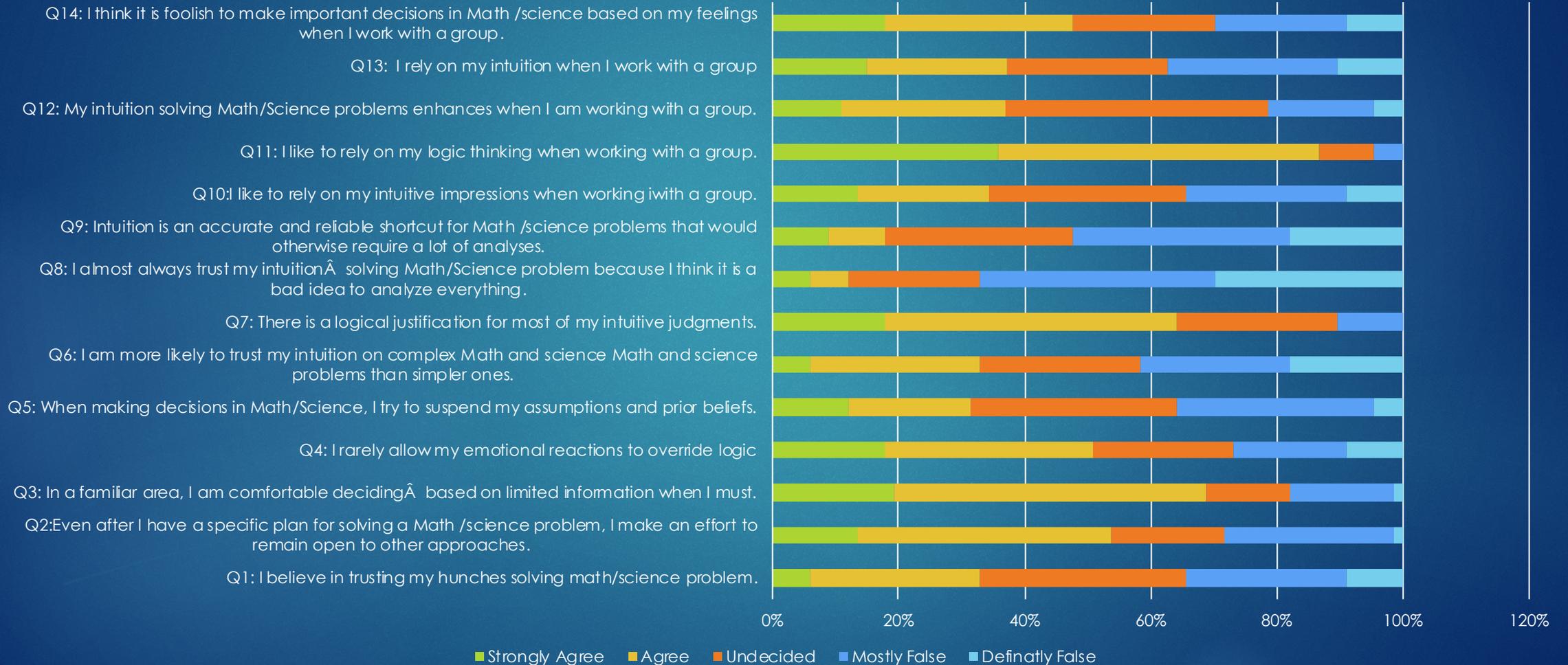
# GRAPHS

Energy 1351 Students Phase#3  
 #Participants=13  
 Sciences/Engineers=69%, Non-Science=31%



# GRAPHS

Science 3304 Students Phase#3  
 #Participants=67  
 Major: Education=87%, Non-Education=13%



# RESULTS :

## Astronomy 1345 :

|           | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10 | Q11 | Q12 | Q13 | Q14 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| YES       | 38% | 71% | 75% | 46% | 33% | 40% | 75% | 15% | 23% | 40% | 73% | 48% | 40% | 54% |
| Undecided | 31% | 13% | 18% | 25% | 25% | 27% | 17% | 24% | 28% | 24% | 14% | 32% | 21% | 15% |
| NO        | 31% | 17% | 7%  | 30% | 31% | 33% | 9%  | 60% | 49% | 37% | 12% | 20% | 39% | 31% |

## Phys1351 (Energy):

|     | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10 | Q11 | Q12 | Q13 | Q14 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Yes | 15% | 78% | 70% | 69% | 54% | 46% | 54% | 23% | 8%  | 23% | 92% | 16% | 15% | 69% |
| U   | 31% | 15% | 23% | 23% | 31% | 0%  | 31% | 23% | 15% | 15% | 8%  | 31% | 8%  | 8%  |
| NO  | 53% | 8%  | 8%  | 8%  | 15% | 54% | 15% | 53% | 77% | 61% | 0%  | 54% | 77% | 23% |

## Science 3304:

|           | Q1  | Q2  | Q3  | Q4  | Q5  | Q6  | Q7  | Q8  | Q9  | Q10 | Q11 | Q12 | Q13 | Q14 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Yes       | 33% | 43% | 68% | 41% | 31% | 33% | 64% | 12% | 18% | 34% | 87% | 37% | 37% | 48% |
| Undecided | 33% | 18% | 13% | 22% | 33% | 25% | 25% | 21% | 30% | 31% | 9%  | 42% | 25% | 22% |
| NO        | 34% | 28% | 17% | 27% | 35% | 42% | 10% | 67% | 52% | 34% | 4%  | 23% | 37% | 30% |

# CONCLUSIONS:

## A) USING INTUITION IN GENERAL

1- ALL PARTICIPANTS BELIEVE IN THE ROLE OF INTUITION AS ONE APPROACH TO A SOLUTION (IN MATH/SCIENCE).

FIRST PLACE ASTRO 1345: 38%

SECOND PLACE SCIENCE 3304: 33%

THIRD PLACE PHYS 1351: 15%

2- ALL PARTICIPANTS GIVE HIGH SCORES TO THE LOGICAL EXPLANATION OF INTUITION ROLE.

FIRST PLACE ASTRO 1345: 75%

SECOND PLACE SCIENCE 3304: 64%

THIRD PLACE PHYS 1351: 54%

3- NO TRUST IN USING INTUITION UNLESS THE WORK PLATFORM WAS BASED ON LOGIC

FIRST PLACE PHYS 1351 : 77%

SECOND PLACE SCIENCE 3304: 52%

THIRD PLACE ASTRONOMY 1345 : 49%



# CONCLUSIONS:

## B) USING INTUITION WORKING WITH A GROUP

1- MOST PARTICIPANTS ARE NOT IN FAVOR OF FIRST USING INTUITION WHEN WORKING WITH GROUP. THEY WANT TO RELY ON LOGIC

FIRST PLACE PHYS 1351 : 92%

SECOND PLACE SCIENCE 3304: 87%

THIRD PLACE ASTRO1345: 73%

2- HOWEVER, SOME PARTICIPANTS ARE OPEN TO USE INTUITION WHILE WORKING WITH GROUP.

FIRST PLACE ASTRO 1345: 40%

SECOND PLACE SCIENCE 3304: 34%

THIRD PLACE PHYS 1351: 23%

3- SOME BELIEVES THEIR INTUITION IS ENHANCED WORKING WITH A GROUP

FIRST PLACE ASTRO 1345 : 48%

SECOND PLACE SCIENCE 3304: 37%

THIRD PLACE PHYS 1351: 16%



# LAST WORD

- 1- THE RESULTS OF THIS STUDY IS PRELIMINARY.
- 2- THE FIRST TWO PARTS (PHASE#1 AND #2) ARE NOT INCLUDED HERE.
- 3- A BETTER CORRELATION BETWEEN INTUITION AND ACADEMIC SUCCESS IS NOT YET TO BE CLEAR UNTIL WE COMPARE THIS RESULTS WITH THE STUDENTS' GPA.
- 4- MORE OF ANALYSIS IS NEEDED TO ASSOCIATE GENDER, AGE, FAMILY STATUS AND THE USE OF INTUITION THEN PASSING THE COURSE.
- 5- IF THERE IS A POSITIVE OR STRONG CORRELATION BETWEEN THE USE OF INTUITION AND HIGH ACADEMIC PERFORMANCE, RECOMMENDATIONS WILL BE MADE TO THE COLLEGE OF SCIENCE TO ENHANCE THE USE OF INTUITION PRACTICING MATH AND SCIENCES.

**THANKS**

