EXPLORING WOMEN'S STEREOTYPE THREAT IN TEAM-BASED EDUCATIONAL SETTINGS
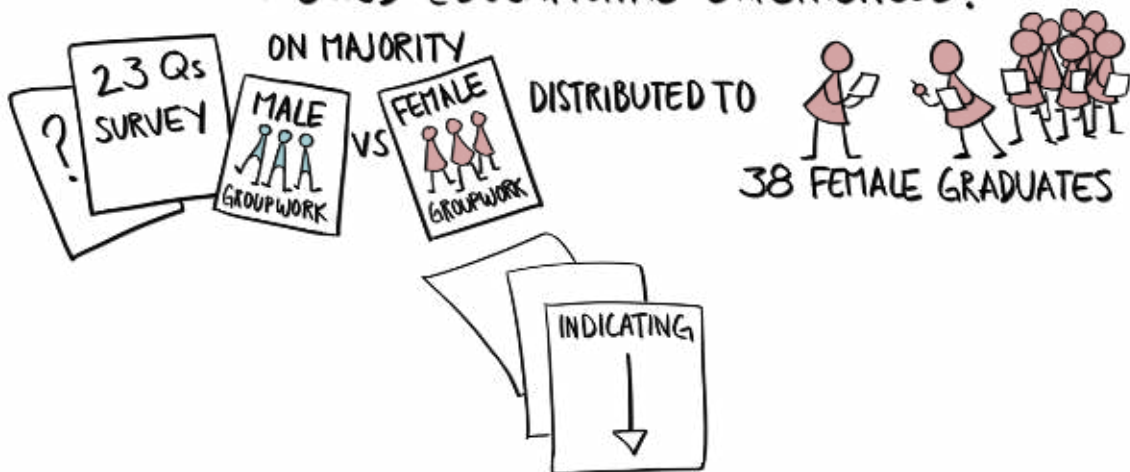
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VISUAL PAPER ABSTRACT:

Keywords: Women Design Teams, Industrial Design Team Projects, Project Team Organization, Stereotype Threat in Design Education

ENHANCE LEARNING EXPERIENCES

LEADERSHIP ROLES

PERFORM TECHNICAL TASKS

BE HEARD

FEEL LIKE THEY FIT IN

FEMALE STUDENTS HAVE INCREASED LEARNING EXPERIENCE WHEN ON FEMALE MAJORITY TEAMS.

DESIGN AND ENGINEERING EDUCATORS SHOULD:

UNDERSTAND, IDENTIFY & DISCUSS

STEREOTYPE BEHAVIORS & TOPICS

FORM TEAMS WITH A 40/60% GENDER COMPOSITION

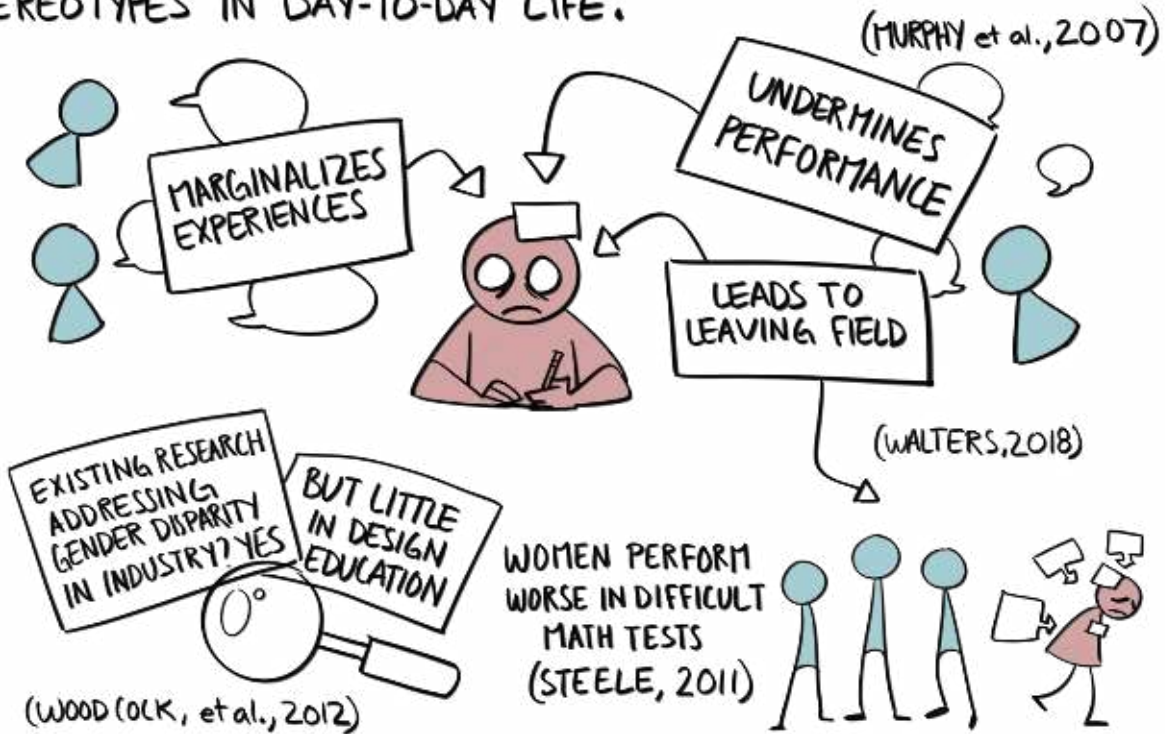TO IMPROVE FEMALE LEARNING EXPERIENCES

1.0 INTRODUCTION

STEREOTYPE THREAT (STEELE, 2011) = WHEN A PERSON EXPERIENCES A THREATENING SITUATION WHERE A NEGATIVE STEREOTYPE OF ONE OF THEIR IDENTITIES EXIST.

STEREOTYPES FROM GENDER, NATIONALITY, AGE, RELIGION, etc.

STEREOTYPES IN DAY-TO-DAY LIFE:

(MURPHY et al., 2007)

MARGINALIZES EXPERIENCES

UNDERMINES PERFORMANCE

LEADS TO LEAVING FIELD

(WALTERS, 2018)

EXISTING RESEARCH ADDRESSING GENDER DISPARITY IN INDUSTRY? YES

BUT LITTLE IN DESIGN EDUCATION

WOMEN PERFORM WORSE IN DIFFICULT MATH TESTS (STEELE, 2011)

(WOODCOCK, et al., 2012)

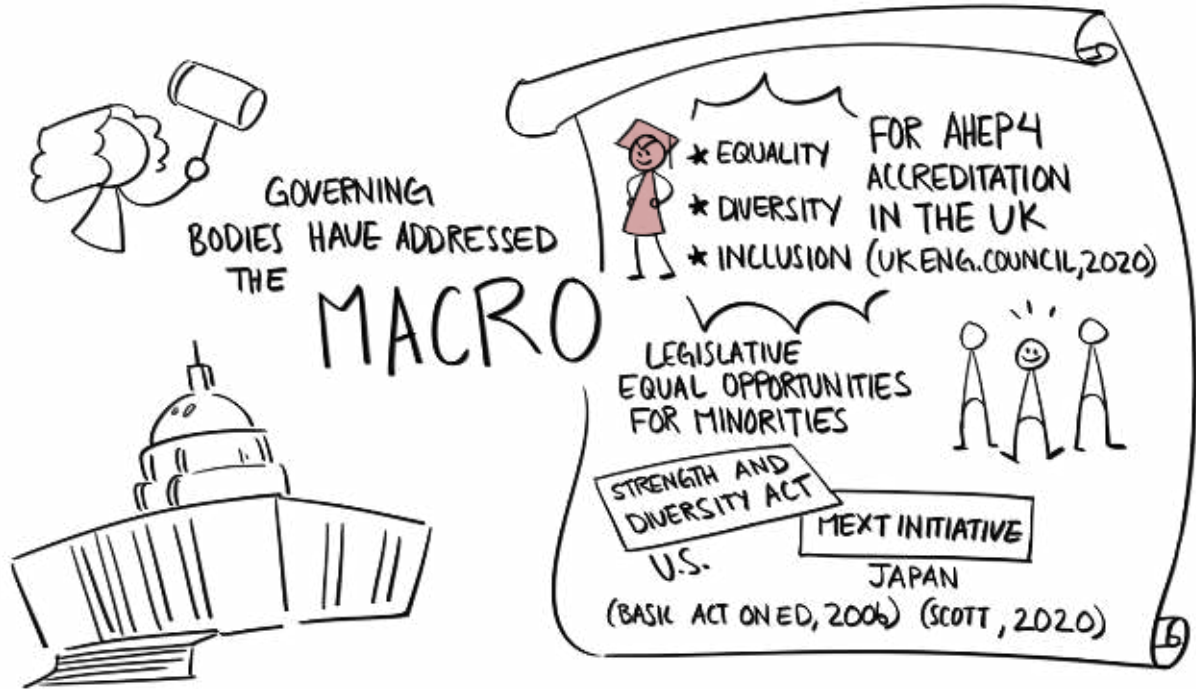PROFESSIONALLY, WOMEN MAKE UP

22% OF THE UK'S DESIGN WORKFORCE
(BRUCE, 1985)

AND

13% OF THE USA'S ENGINEERING WORKFORCE
(RINCON, 2014)

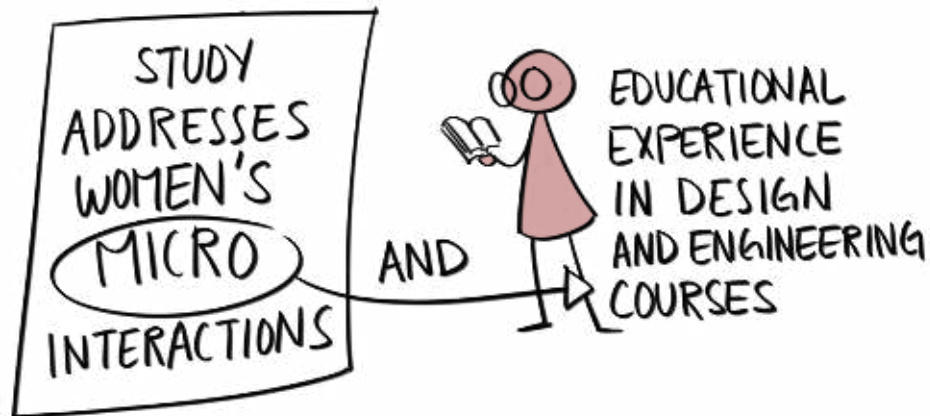THE STEREOTYPE THREAT WOMEN EXPERIENCE IN EDUCATION CONTRIBUTES TO THIS DISPARITY.

1.0 INTRODUCTION CONTINUED

GOVERNING BODIES HAVE ADDRESSED THE **MACRO**

* EQUALITY
* DIVERSITY
* INCLUSION

FOR AHEP4 ACCREDITATION IN THE UK (UK ENG. COUNCIL, 2020)

LEGISLATIVE EQUAL OPPORTUNITIES FOR MINORITIES

STRENGTH AND DIVERSITY ACT

MEXT INITIATIVE

U.S. (BASK ACT ON ED, 2006)

JAPAN (SCOTT, 2020)

I OBSERVE WOMEN IN DESIGN ON MALE MAJORITY TEAMS:

- TAKE ON SECRETARY ROLES
- ARE NOT THE LEADERS
- AVOID TECHNICAL TASKS
- DOUBT

STUDY ADDRESSES WOMEN'S MICRO INTERACTIONS AND EDUCATIONAL EXPERIENCE IN DESIGN AND ENGINEERING COURSES

THIS PAPER INTRODUCES 23 STEREOTYPE BASED TOPICS TO ENHANCE FEMALE TEAM BASED EDUCATIONAL EXPERIENCES

2.0 METHODS

WE INTERVIEWED 3 FEMALE DESIGN STUDENTS AND 1 MATH STUDENT

ON HOW GENDER IMPACTED THEIR ACADEMIC CAREERS
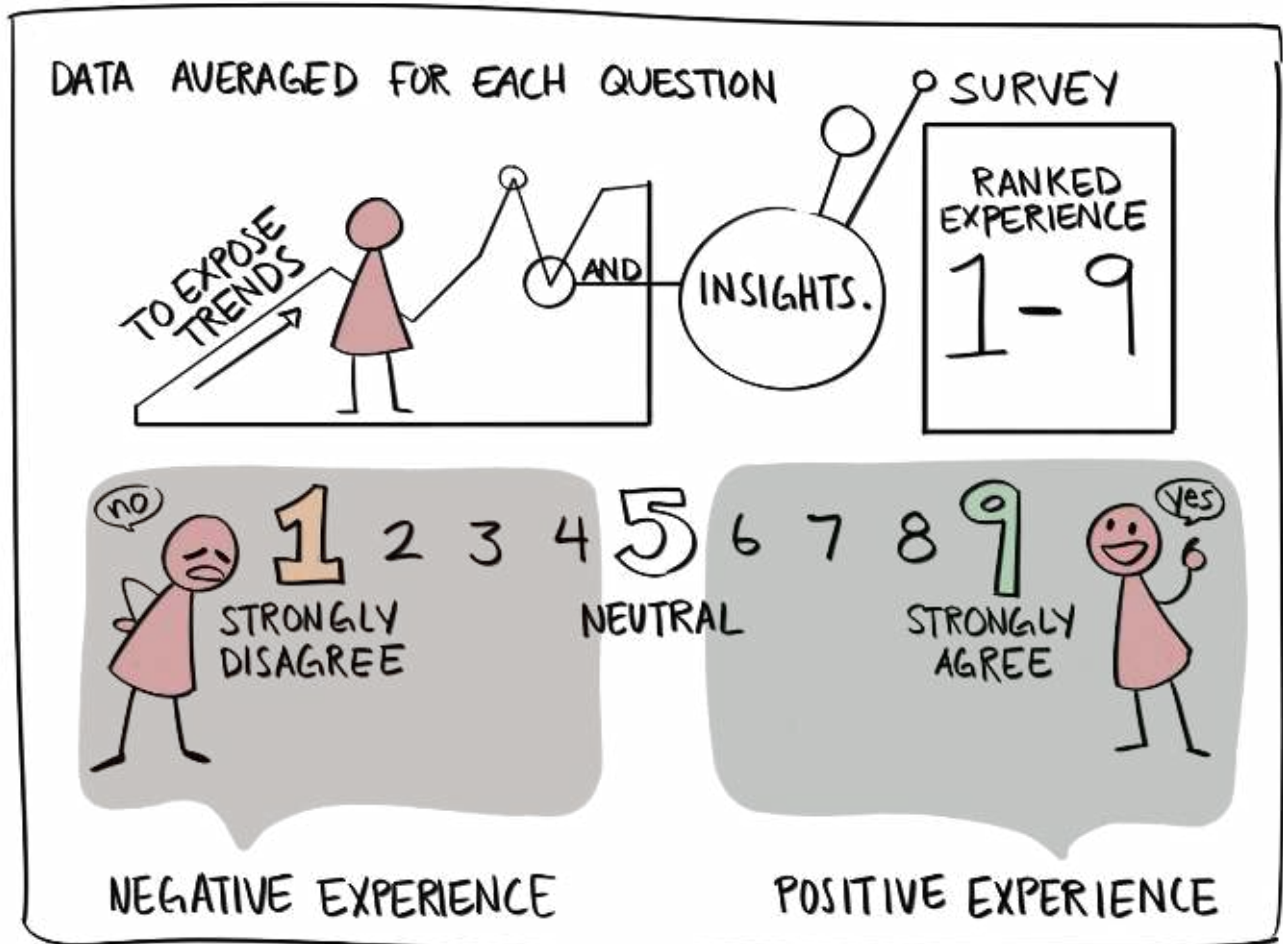
AND SURVEYED AND ASSESSED 38 FEMALE STUDENTS:

23 QUESTION SURVEY BASED ON INTERVIEWS

RESPONDING ON EXPERIENCES IN TEAMS OF MAJORITY

MALE OR FEMALE

QUESTIONS ON:

TEAM PARTICIPATION AND SELF-PERCEPTION

SECTION 1: 4 Qs

CONFIRMED DESIGN / S.T.E.M. ENROLLMENT

SECTION 2: 23 Qs

EVALUATED ♀ EXPERIENCE ON MALE-MAJORITY TEAMS

SECTION 3: SAME 23 Qs

EVALUATED ♀ EXPERIENCE ON FEMALE-MAJORITY TEAMS

DATA AVERAGED FOR EACH QUESTION

TO EXPOSE TRENDS

AND

INSIGHTS.

SURVEY

RANKED EXPERIENCE

1-9

no 1 2 3 4 5 6 7 8 9 yes

STRONGLY DISAGREE

NEUTRAL

STRONGLY AGREE

NEGATIVE EXPERIENCE

POSITIVE EXPERIENCE

3.0 RESULTS

FAVORABILITY OF EXPERIENCES BETWEEN MAJORITY MALE AND MAJORITY FEMALE TEAMS

MALE MAJORITY VS FEMALE MAJORITY

FEMALES RATED MAJORITY FEMALE TEAMS MORE FAVORABLE RATINGS IN ALL QUESTIONS
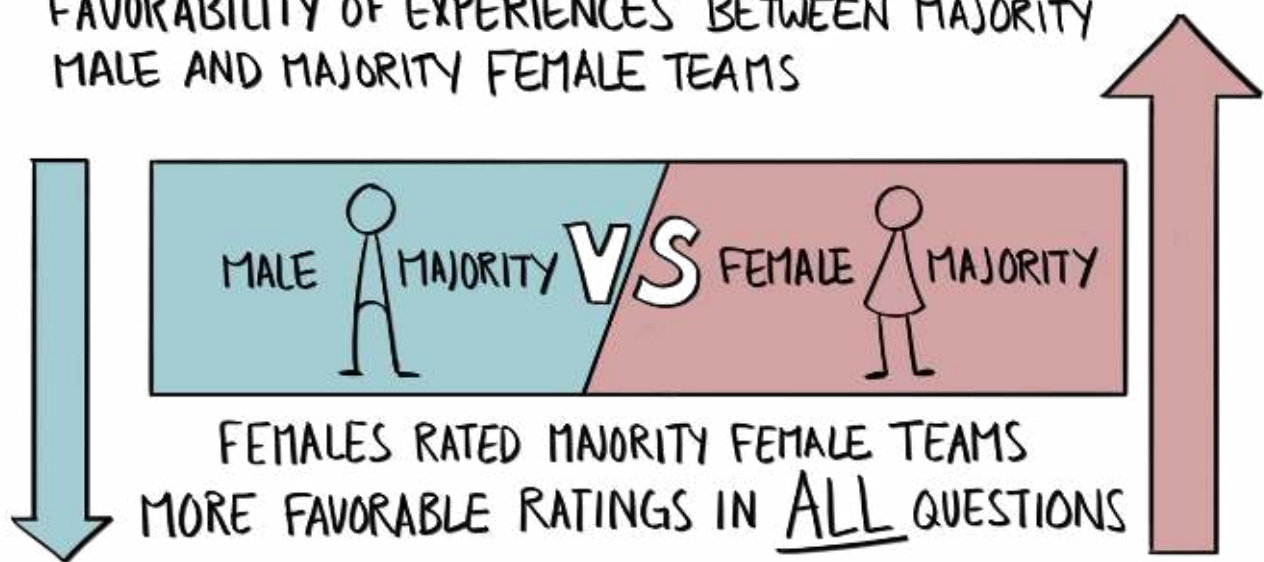
3.0 RESULTS CONTINUED

TABLE 1: TEAM PARTICIPATION SCORES BETWEEN MAJORITY FEMALE AND MALE TEAMS.

Q#	QUESTION	MAJORITY FEMALE	MAJORITY MALE	DIFFERENCE
1	WE FAIRLY DISTRIBUTE TECHNICAL TASKS	7.21	5.10	2.11
2	I HAVE OPPORTUNITIES FOR LEADERSHIP	6.59	4.50	2.09
3	COMMUNICATION IS EASY	7.05	5.05	2.00
4	WE SHARE PROJECT OWNERSHIP	7.69	6.08	1.62
5	I AM ENGAGED WITH MY OWN TEAM	7.67	6.05	1.62
6	MY IDEAS ARE CONSIDERED	5.72	4.13	1.59
7	MY PEERS ARE PERSUADED BY MY IMPUT	5.26	3.75	1.51
8	I AM INCLUDED IN DECISION-MAKING	6.49	5.08	1.41

TABLE 2: SELF-PERCEPTION SCORES BETWEEN MAJORITY FEMALE AND MALE TEAMS.

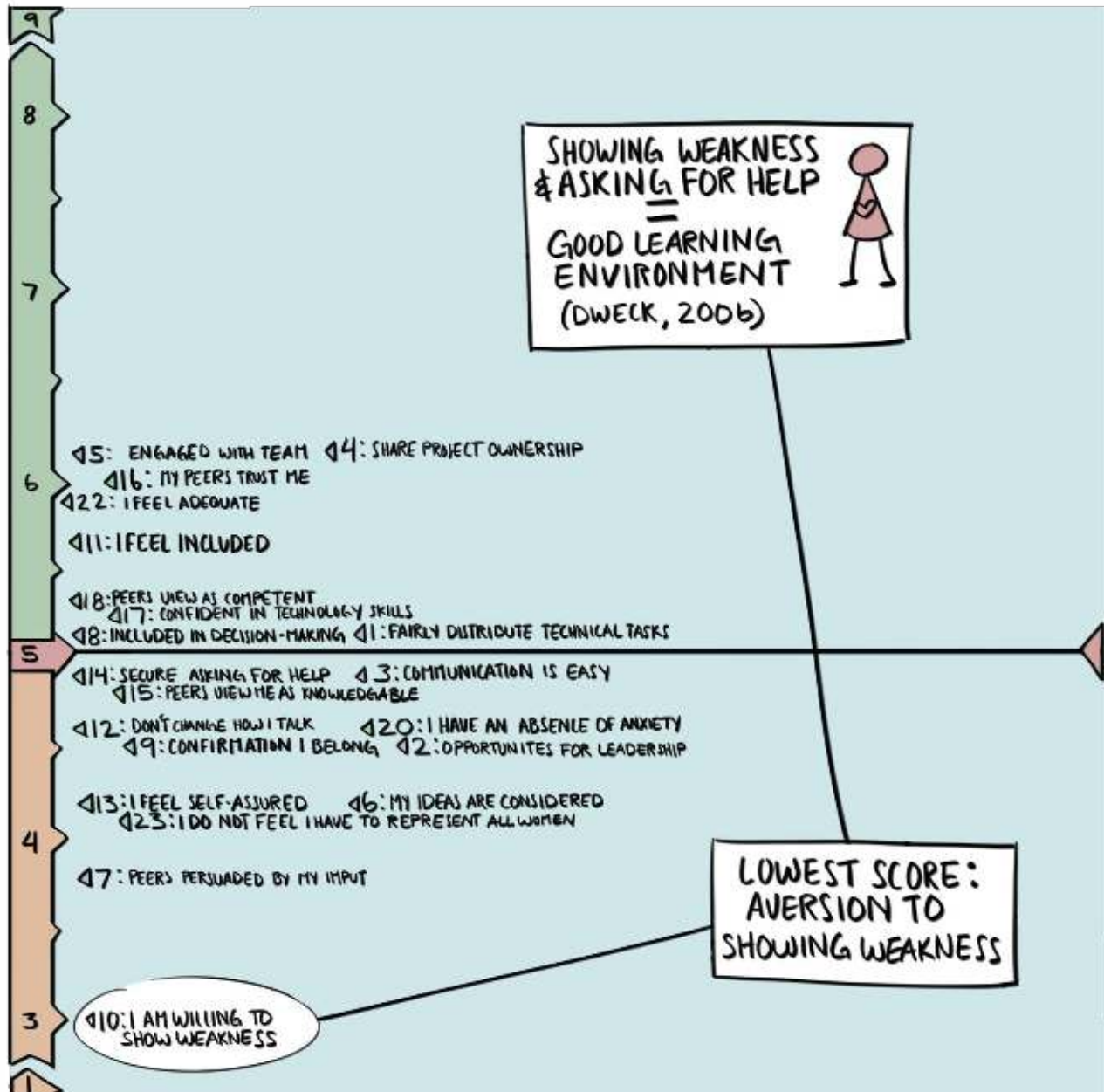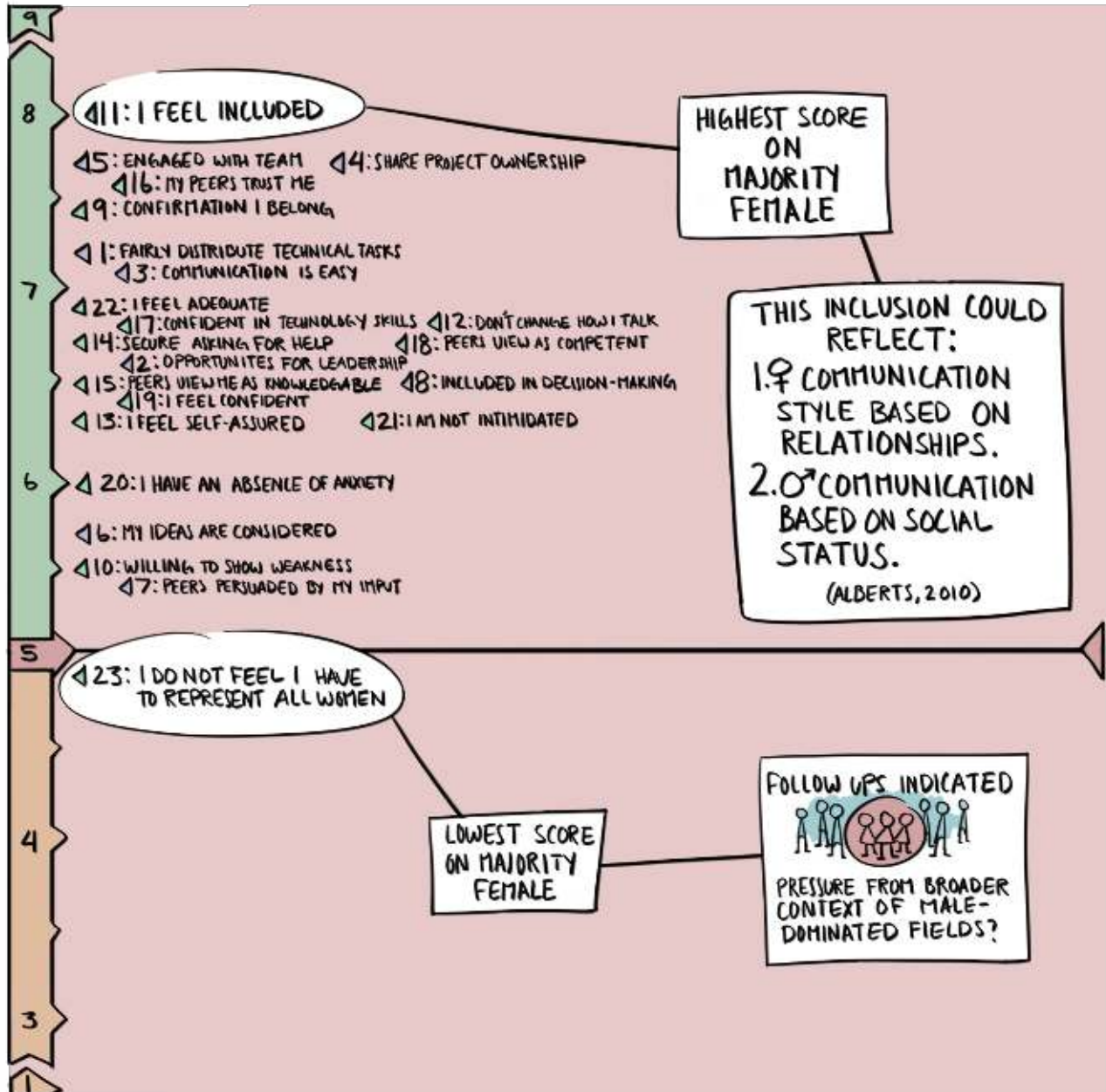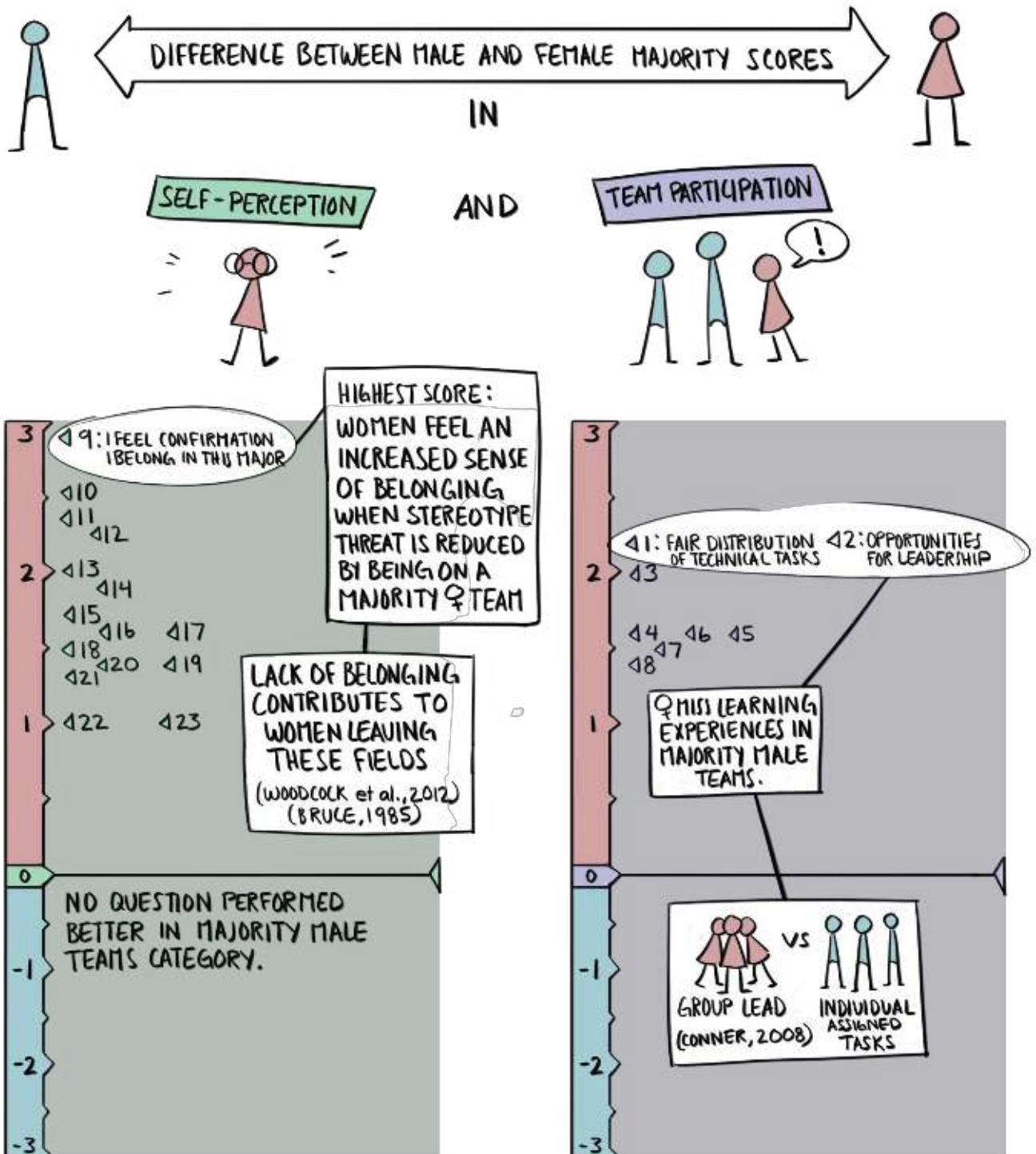| Q#	QUESTION	MAJORITY FEMALE	MAJORITY MALE	DIFFERENCE
9	I FEEL CONFIRMATION THAT I BELONG IN THIS MAJOR	7.36	4.50	2.86
10	I AM WILLING TO SHOW WEAKNESSES	5.49	3.00	2.49
11	I FEEL INCLUDED	8.00	5.7	2.30
12	I DON'T CHANGE THE WAY I TALK	6.77	4.55	2.22
13	I FEEL SELF-ASSURED	6.26	4.23	2.03
14	I FEEL SECURE ASKING OTHERS FOR HELP	6.74	4.85	1.89
15	MY PEERS VIEW ME AS KNOWLEDGABLE	6.54	4.80	1.74
16	MY PEERS TRUST ME	7.63	6.00	1.63
17	I AM CONFIDENT IN MY TECHNOLOGY SKILLS	6.77	5.15	1.62
18	MY PEERS VIEW ME AS COMPETENT	6.79	5.25	1.54
19	I FEEL CONFIDENT	6.44	5.00	1.44
20	I HAVE AN ABSENCE OF ANXIETY	6.00	4.59	1.41
21	I AM NOT INTIMIDATED	6.33	4.97	1.36
22	I FEEL ADEQUATE	6.92	5.87	1.05
23	I DO NOT FEEL I HAVE TO REPRESENT ALL WOMEN	4.85	3.79	1.05

FIGURE 1. FAVORABILITY OF EXPERIENCE BETWEEN MALE AND FEMALE MAJORITY TEAMS. THE GREATER THE NUMBER, THE MORE POSITIVE THE EXPERIENCE AND VICE VERSA.

MAJORITY FEMALE TEAMS

◁11: I FEEL INCLUDED

◁5: ENGAGED WITH TEAM   ◁4: SHARE PROJECT OWNERSHIP
    ◁16: MY PEERS TRUST ME
◁9: CONFIRMATION I BELONG

◁1: FAIRLY DISTRIBUTE TECHNICAL TASKS
    ◁3: COMMUNICATION IS EASY

◁22: I FEEL ADEQUATE
    ◁17: CONFIDENT IN TECHNOLOGY SKILLS ◁12: DON'T CHANGE HOW I TALK
◁14: SECURE ASKING FOR HELP   ◁18: PEERS VIEW AS COMPETENT
    ◁2: OPPORTUNITES FOR LEADERSHIP
◁15: PEERS VIEW ME AS KNOWLEDGABLE ◁8: INCLUDED IN DECISION-MAKING
    ◁19: I FEEL CONFIDENT
◁13: I FEEL SELF-ASSURED   ◁21: I AM NOT INTIMIDATED

◁20: I HAVE AN ABSENCE OF ANXIETY

◁6: MY IDEAS ARE CONSIDERED

◁10: WILLING TO SHOW WEAKNESS
    ◁7: PEERS PERSUADED BY MY INPUT

◁23: I DO NOT FEEL I HAVE
    TO REPRESENT ALL WOMEN

HIGHEST SCORE ON MAJORITY FEMALE

THIS INCLUSION COULD REFLECT:
1. ♀ COMMUNICATION STYLE BASED ON RELATIONSHIPS.
2. ♂ COMMUNICATION BASED ON SOCIAL STATUS.
(ALBERTS, 2010)

LOWEST SCORE ON MAJORITY FEMALE

FOLLOW UPS INDICATED

PRESSURE FROM BROADER CONTEXT OF MALE-DOMINATED FIELDS?

FIGURE 1. FAVORABILITY OF EXPERIENCE BETWEEN MALE AND FEMALE MAJORITY TEAMS. THE GREATER THE NUMBER, THE MORE POSITIVE THE EXPERIENCE AND VICE VERSA.

3.2 QUESTIONS RE-RANKED BY SCORE DIFFERENCE

FIGURES 2 AND 3. THESE GRAPHS RE-ORDER THE 23 QUESTIONS BY THE DIFFERENCE IN SCORES. THE HIGHER THE RATING ON THIS GRAPH, THE GREATER THE DISPARITY IN EDUCATIONAL EXPERIENCE BETWEEN PARTICIPATION ON A MAJORITY FEMALE TEAM (PINK) AND MAJORITY MALE TEAM (BLUE).
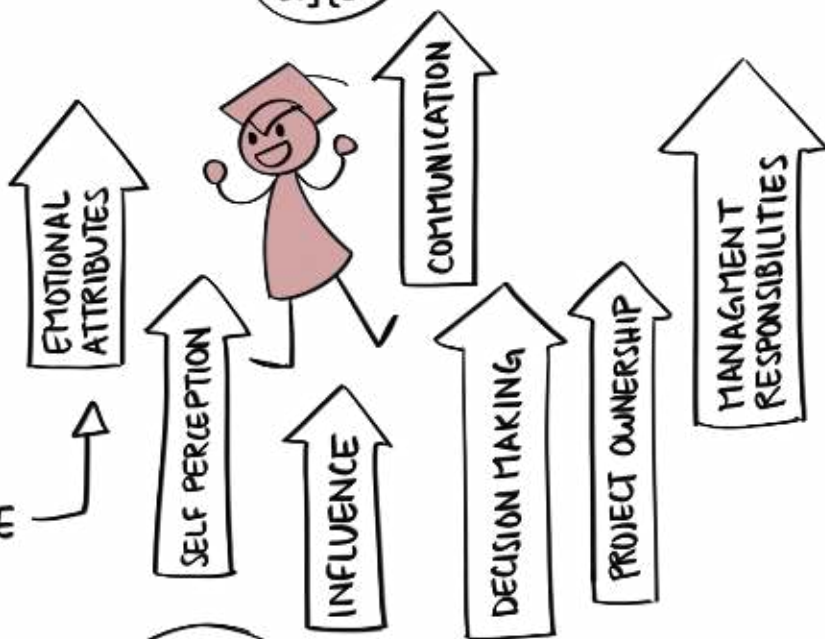
4.0 DISCUSSION
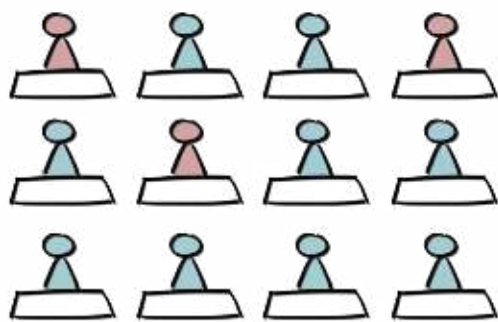
MAJORITY OF DESIGN AND ENGINEERING UNIVERSITY PROGRAMS HAVE MORE MALE ENROLLMENT.
(FAIRS, 2020) (RINCO, 2019)
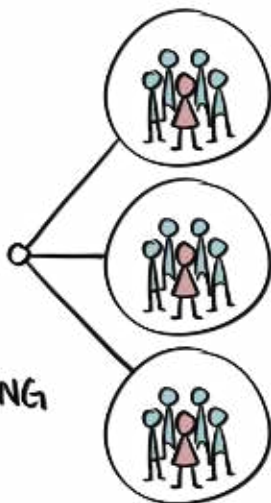
CONSEQUENTLY, PROJECTS FREQUENTLY ISOLATE WOMEN ACROSS MALE-MAJORITY TEAMS
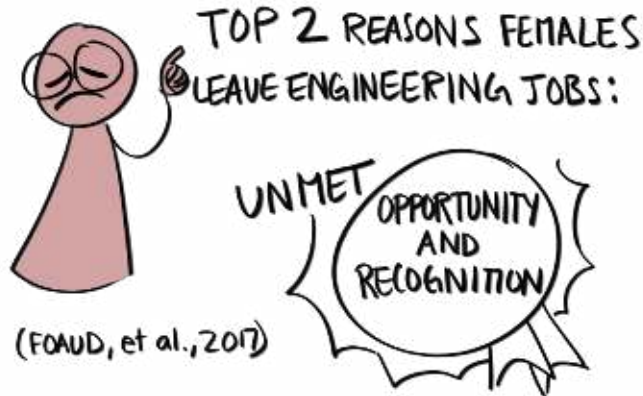
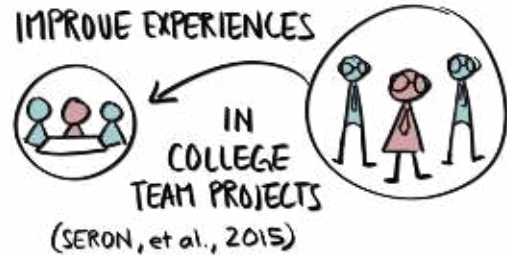TEAMS SHOULD BE

NO LESS THAN 40% FEMALE

EMOTIONAL ATTRIBUTES

COMMUNICATION

SELF PERCEPTION

INFLUENCE

DECISION MAKING

PROJECT OWNERSHIP

MANAGMENT RESPONSIBILITIES

DISPROPORTIONATE MAJORITY CAUSES:

DISSOCIATION & DISSATISFACTION IN UNDERGRADUATE EXPERIENCE

4.0 DISCUSSION CONTINUED

TOP 2 REASONS FEMALES LEAVE ENGINEERING JOBS:

UNMET **OPPORTUNITY AND RECOGNITION**

(FOUAD, et al., 2017)

COULD IMPROVE "FIT" IN PROFESSIONAL ENGINEERING CULTURE:

IMPROVE EXPERIENCES IN COLLEGE TEAM PROJECTS

(SERON, et al., 2015)

BRIGHAM YOUNG UNIVERSITY ENTERING FRESHMEN CLASS

20-21% WOMEN
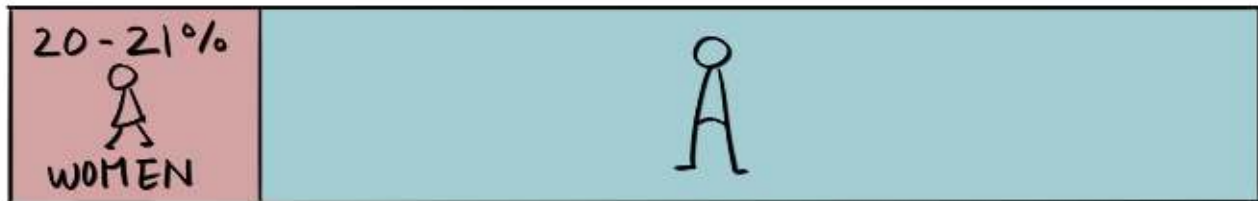
IN ENGINEERING AND TECHNOLOGY
OVER THE LAST 8 YEARS
⬇ 5 YEARS LATER

9-10% WOMEN

AWARDED UNDERGRADUATE DEGREE

ROUGHLY 50% OF OUR ENGINEERING COLLEGE WOMEN CHANGE MAJORS.

OUR DATA SUGGESTS THAT ONGOING SOCIAL THREAT PLAYS A STRONG ROLE IN THIS EXIT.
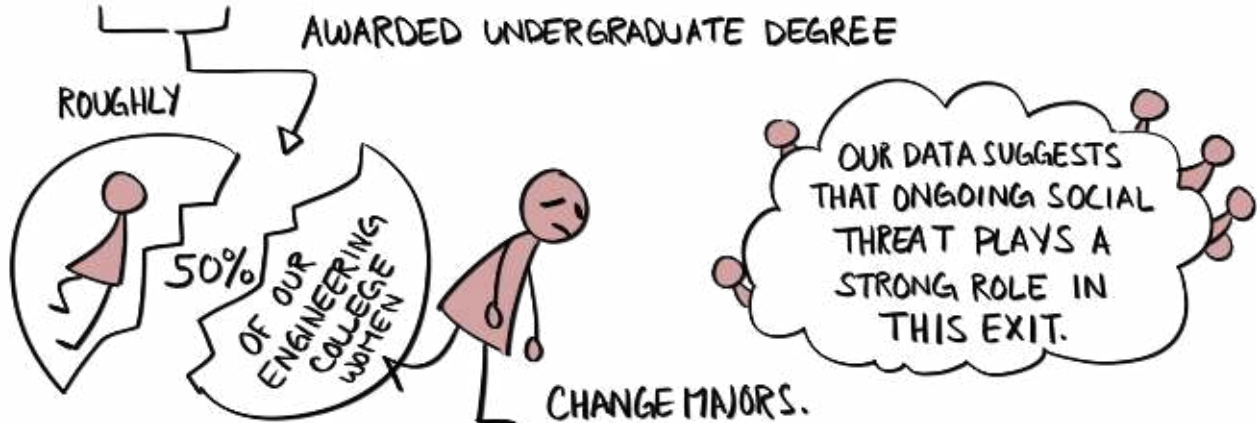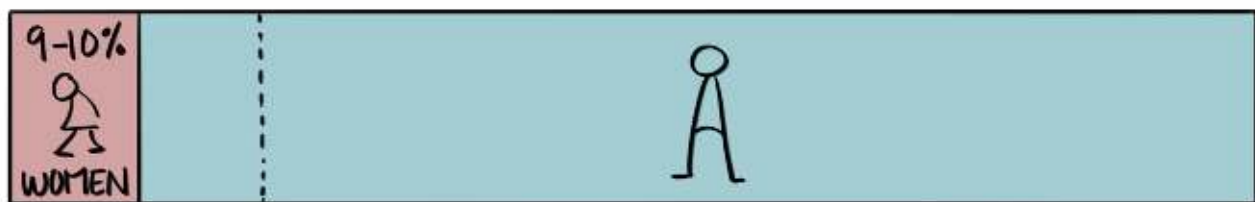
4.0 DISCUSSION CONTINUED

TO REDUCE THIS FEMALE EXIT:

MAKE EDUCATORS AWARE OF STEREOTYPE THREAT

ALWAYS HAVE A CRITICAL MASS OF 60%-40% MALE-FEMALE ON TEAMS

POSITIVE EDUCATIONAL EXPERIENCE FOR ALL STUDENTS

IMPROVE WOMEN'S EDUCATION IN THE FUTURE

WE ACKNOWLEDGE THIS STUDY NEEDS WIDER DISTRIBUTION

EVEN SO, OVERWHELMING PREFERENCE TOWARDS MAJORITY FEMALE GROUPS.

STUDY HAS WEAKNESSES, BUT WE BELIEVE THE RESULTS ARE WORTH PURSUING AND A VITAL PART OF THE CONVERSATION.

FOR FUTURE OF EQUAL LEARNING EXPERIENCES

IN DESIGN AND ENGINEERING EDUCATION.

5.0 CONCLUSION

MY RECENT EXPERIENCES ORGANIZING MAJORITY FEMALE TEAMS HAS BEEN OVERWHELMINGLY POSITIVE.

POSITIVE LEARNING EXPERIENCE

I WILL NEVER AGAIN ISOLATE A WOMAN ON A GROUP PROJECT.

GOAL=

60/40% TEAM GENDER COMPOSITION

ENHANCE LEARNING EXPERIENCES

LEADERSHIP ROLES

PERFORM TECHNICAL TASKS

BE HEARD

FEEL LIKE THEY FIT IN

REMEMBER:

STEREOTYPE THREAT IS NOT LIMITED TO GENDER.

STEREOTYPE THREAT IS REAL, HOW EDUCATORS MANAGE IT WILL EFFECT MINORITY'S EDUCATIONAL EXPERIENCE.

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