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BRIDGING THE GAP BETWEEN CONSULTING AND TEACHING: THE UCLA EXPERIENCE

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WHAT MAKES YOU A SUCCESSFUL CONSULTANT?
EVALUATION OF INTERVENTIONS

- GET TO KNOW THE OVERALL GOALS OF THE INSTITUTION CONDUCING THE INTERVENTION AND THE SPECIFIC QUESTIONS OF THE INTERVENTION

- GET TO KNOW THE THEORETICAL AND PRACTICAL ASPECTS OF THE INTERVENTION (EXAMPLES WILL BE GIVEN)

- ATTEND THE WORKSHOPS HELD FOR TRAINING THOSE WHO WILL IMPLEMENT THE INTERVENTION. THIS WILL HELP YOU ALIGN THE EVALUATION PROCEDURES WITH THE OBJECTIVES OF THE INTERVENTION

- ASCERTAIN THAT THE DESIGN OF THE STUDY IS ALIGNED WITH THE QUESTIONS THAT NEED TO BE ANSWERED BY THE INTERVENTION

- TAILOR THE INSTRUMENTS TO THE OBJECTIVES OF THE INTERVENTION

- AVOID USING EXISTING INSTRUMENTS THAT ARE NOT ALIGNED WITH THE OBJECTIVES OF THE INTERVENTION

- ESTABLISH VALIDITY AND RELIABILITY OF THE DESIGNED INSTRUMENTS

- SEEK THE INPUT OF THOSE WHO HAVE DESIGNED THE INTERVENTION AND THE TRAINING ON THE DEVELOPMENT AND REFINEMENT OF THE INSTRUMENTS

- SHARE THE OBJECTIVES OF THE EVALUATION, THE INSTRUMENTS, AND DATA COLLECTION PROCEUDRES WITH THOSE WHO WILL IMPLEMENT THE INTERVENTION
- PLAN FOR AS LARGE A SAMPLE AS FEASIBLE. ATTRITION IS ALWAYS A POTENTIAL PROBLEM, ESPECIALLY FOR INTERVENTIONS CONDUCTED IN TRANSIENT GEOGRAPHICAL AREAS

WHAT MAKES YOU A SUCCESSFUL CONSULTANT?

EVALUATION OF INTERVENTIONS

- DEVISE A STATISTICAL ANALYSIS PLAN THAT IS ALIGNED WITH THE QUESTIONS THAT NEED TO BE ANSWERED BY THE INTERVENTION

- LOOK INTO GATHERING QUANTITATIVE AS WELL AS QUALITATIVE DATA (EXAMPLES WILL BE GIVEN)

- GATHER FIRST HAND QUALITATIVE INFORMATION ON HOW THE INTERVENTION IS BEING IMPLEMENTED (EXAMPLES WILL BE GIVEN)

- PRACTICE CAUTION WITH POOLING THE DATA ACROSS THE DIFFERENT INDIVIDUALS THAT IMPLEMENT THE INTERVENTION

- ALIGN THE QUALITATIVE AND QUANTITATIVE FINDINGS FOR THE INDIVIDUALS IMPLEMENTING THE INTERVENTION (EXAMPLES WILL BE GIVEN)

- WRITE A SHORT SUMMARY FOR THE NON-STATISTICAL AUDIENCE COVERING SPECIFIC OBJECTIVES OF THE INTERVENTION, MAJOR FINDINGS, AND RECOMMENDATIONS IN THE CONTEXT OF THE INTERVENTION. AVOID USING STATISTICAL SYMBOLS

- PROVIDE THE CLIENT WITH A DETAILED AND THOROUGH REPORT COVERING OBJECTIVES OF THE INTERVENTON, DESIGN, SAMPLING PROCEDURES, IMPLEMENTATION OF THE INTERVENTON, SUMMARY OF RESULTS PLUS MAJOR FINDINGS EXPRESSED IN THE CONTEXT OF THE INTERVENTION, AND RECOMMENDATIONS

DATA SETS PRESENTED IN THE FORM OF CASE STUDIES HAVE MADE IT POSSIBLE FOR US TO:
- WALK AWAY FROM PRESENTING STATISTICS AS A SERIES OF STEPWISE AND REPETITIVE PROCEUDRES WITH FICTITIOUS DATA SET, AND **INSTEAD**
- INTRODUCE STATISTICS AS A MEAN OF ANSWERING REAL WORLD QUESTIONS AND COMMUNICATING RESULTS

STRATEGIES THAT HAVE HELPED US REACH THE ABOVE GOALS INCLUDE:

- CHOOSE DATA SETS AND PRESENT THEM AS CASES TO WHICH STUDENTS FROM DIFFERENT MAJORS CAN RELATE
- TELL THE FULL STORY BEHIND THE CASE INCLUDING PURPOSE, DESIGN, SAMPLING, INSTRUMENTS, DATA COLLECTION, ETC.
- PROVIDE A DETAILED CODEBOOK WITH ALL THE VARIABLES IN THE CASE AND HOW THEY WERE MEASURED
- INTRODUCE STATISTICS AS A "SCIENCE OF DATA" AND NOT A BRANCH OF MATHEMATICS
- MINIMIZE EMPHASIS ON STEPWISE CALCULATIONS AND MAXIMIZE THE IMPORTANCE OF USING STATISTICS TO ANSWER QUESTIONS ABOUT THE CASE
- MODEL THE STEPS TAKEN BY A STATISTICAL CONSULTANT TO ANSWER "REAL WORLD" QUESTIONS
- EMPHASIZE THE ROLE, MODEL, AND ENGAGE THE STUDENTS IN "TECHNICAL WRITING"
- DEMONSTRATE THE POTENTIAL PROBLEMS WHEN DEALING WITH REAL DATA AND HOW THEY CAN BE SOLVED
- DESIGN HOMEWORK ASSIGNMENTS, TAKE-HOME EXAMS, AND GROUP PROJECTS THAT ENGAGE THE STUDENTS IN PROBLEM SOLVING AND CRITICAL THINKING THROUGH POSING QUESTIONS ABOUT THE CASE AND USING APPLIED STATISTICS TO ANSWER THESE QUESTIONS
- HAVE STUDENTS READ, ANALYZE, AND INTERPRET JOURNAL ARTICLES PUBLISHED ABOUT THE CASES DISCUSSED

WHY HAVE WE FOUND TEACHING TECHNICAL WRITING A CHALLENGE?

- BASED ON THEIR MODELS OF LEARNING, STUDENTS DO NOT THINK WRITING SHOULD BE A MAJOR PART OF STATISTICS.

- STUDENTS IN GENERAL AND MATH AND ENGINEERING MAJORS IN PARTICULAR ARE NOT TRAINED HOW TO WRITE AND THUS FEEL UNCOMFORTABLE TO BE JUDGED ON THE BASIS OF SOMETHING THEY HAVE NOT BEEN TRAINED FOR.

- STUDENTS GENERALLY PROVIDE FACTS AND NOT CONCLUSIONS DEFENDED BY NUMBERS AND FIGURES.

- STUDENTS GENERALLY WRITE THEIR OPINIONS RATHER THAN ARGUMENTS SUPPORTED BY NUMERICAL REASONING.

- STUDENTS HAVE NOT LEARNED THAT THEY NEED TO WRITE SOMETHING A FEW TIMES BEFORE THEY HAVE A FINAL DRAFT.

HOW DO WE APPLY TECHNICAL WRITING IN TEACHING APPLIED STATISTICS?

- COMMUNICATE THE IMPORTANCE OF WRITING IN APPLIED STATISTICS TO THE STUDENTS

- COMMUNICATE TO THE STUDENTS THAT WRITING WILL BE AN INTEGRAL PART OF THIS COURSE

- MODEL WRITING RESULTS FOR A STATISTICAL AND NON-STATISTICAL AUDIENCE IN LECTURE NOTES AND LABS OF WHICH THE STUDENTS GET A COPY

- POSE SHORT QUESTIONS IN LECTURE NOTES AND LAB AND HAVE THE STUDENTS GENERATE LINKS BETWEEN THE DESIGN, STATISTICAL CONCEPTS, METHODS, AND PRINTOUT

- RANDOMLY CALL ON STUDENTS TO ANSWER THE SHORT QUESTION POSED. HAVE OTHER STUDENTS ADD THEIR COMMENTS UNTIL AN ACCEPTABLE RESPONSE IS GENERATED

- PAIR STUDENTS UP AND HAVE THEM READ AND ANALYZE THEIR RESPONSES TO SHORT QUESTIONS

- MAKE WRITING OF RESULTS FOR A STATISTICAL AND NON-STATISTICAL AUDIENCE A MAJOR PART OF HOMEWORKS, TAKE-HOME EXAMS, AND IN-CLASS EXAMS, AND

- HAVE STUDENTS READ AND ANALYZE JOURNAL ARTICLES THAT MODEL HOW THE RESULTS SHOULD BE WRITTEN

USING THE "GENERATIVE MODEL" OF TEACHING AS THE MAJOR APPROACH TO TEACHING FROM CASE STUDIES RESULTING FROM INTERVENTIONS

THE OBJECTIVE OF THE GENERATIVE MODEL OF TEACHING IS TO MINIMIZE THE ROLE OF THE STUDENTS AS PASSIVE RECIPIENTS OF INFORMATION AND TO MAXIMIZE THEIR ROLE IN THE LEARNING PROCESS THROUGH HELPING THEM:

- UNDERSTAND THE RELATIONSHIPS BETWEEN THE DIFFERENT PARTS OF THE CASE,

- GENERATE LINKS AMONG THE DIFFERENT PARTS OF THE CASE,

- GENERATE RELATIONSHIPS BETWEEN THEIR OWN PRIOR KNOWLEDGE AND EXPERIENCE WITH THE NEW INFORMATION, AND

- USE THE NEW INFORMATION TO SOLVE REAL WORLD PROBLEMS AND ANSWER REAL WORLD QUESTIONS.

MAJOR FACTORS INVOLVED IN THE GENERATIVE PROCESS OF TEACHING AND LEARNING:

- **PRECONCEPTION**: LEARNING ABOUT STUDENTS' PRIOR KNOWLEDGE OF STATISTICS, BELIEFS ABOUT STATISTICS, AND THEIR LEARNING STRATEGIES

- **MOTIVATION:** SUCCESS IN GENERATING RELATIONS AMONG OLD KNOWLEDGE AND THE NEW KNOWLEDGE MOTIVATES THE STUDENTS AND HELPS THEM BELIEVE IN THEIR ABILITY TO DO WELL IN STATISTICS

- **ATTENTION:** EXPECTING THE STUDENTS TO BE ACTIVE PARTICIPANTS AND GENERATE RELATIONSHIPS HELPS TO FOCUS THEIR ATTENTION

- **GENERATION**: GENERATION OF RELATIONS BETWEEN THE OLD AND THE NEW AND THE DIFFERENT PARTS OF THE NEW BY THE STUDENTS

HOW DO WE APPLY THE "GENERATIVE TEACHING" MODEL IN TEACHING APPLIED STATISTICS?

- ASSESS STUDENTS' PRE-REQUISITE KNOWLEDGE AND ASCERTAIN THAT THEY LEARN THE MISSING CONCEPTS

- DISCUSS IN WHAT WAYS LEARNING AND TEACHING APPLIED STATISTICS IS DIFFERENT FROM MATHEMATICS

- DISCUSS HOW THE DOMINANT MODELS OF LEARNING MATHEMATICS (DOING PROCEDURE, PROOFS, AND SOLVING PROBLEMS) IS NOT APPLICABLE TO APPLIED STATISTICS

- COMMUNICATE WHY IT IS IMPORTANT THAT THEY BE ACTIVE PARTICIPANTS AND GENERATE THEIR OWN KNOWLEDGE

- MODEL HOW THEY CAN CREATE LINKS BETWEEN ISSUES OF DESIGN, EXPLORATORY DATA ANALYSIS, PROBABILITY, SAMPLING DISTRIBUTIONS, AND HYPOTHESIS TESTING

- COLLECT ANONYMOUS DATA TO MONITOR THEIR LEVEL OF ATTENTION, MOTIVATION, LEARNING, AND INVOLVEMENT IN THE COURSE