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Effectiveness of collaborative concept mapping as a teaching strategy in Gender and Society

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ABSTRACT

This study determined the effectiveness of Collaborative Concept Mapping (CCM) as a teaching strategy in SOCIO 102: Gender and Society among first-year Bachelor of Science in Customs Administration students at the University of Cebu Lapu-Lapu and Mandaue during School Year 2026–2027. An explanatory sequential mixed-method design combined a one-group pretest–posttest design with a focus group discussion (FGD). The respondents were 45 students of an intact class selected through convenience sampling, five of whom were purposively chosen for the FGD. Data were gathered through a validated 25-item researcher-made achievement test (KR-20 = 0.78) covering three topics and an interview guide. Scores were analyzed using frequency, percentage, mean, standard deviation, the Shapiro-Wilk test, and the Wilcoxon signed-rank test, while FGD responses were analyzed through reflexive thematic analysis. Students did not meet expectations in all three topics before the intervention (overall mean = 12.44 of 25, or 49.78%) and reached the fairly satisfactory level afterward (overall mean = 19.42, or 77.69%). The difference was significant in every topic and overall ($p < .001$), with very large effects. Four themes emerged: seeing connections among ideas, learning together through shared understanding, challenges in group dynamics and presentation, and sustaining the strategy with better grouping. The findings suggest that CCM is an effective strategy for teaching Gender and Society, particularly when group work is well structured. Because the study had no control group, causal claims should be made cautiously. Enhancements to the lessons of a self-learning module are recommended.

Keywords: Collaborative concept mapping; Gender and Society; teaching strategy; mixed-methods research; higher education; self-learning module.

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INTRODUCTION

Courses such as Gender and Society ask students to understand interconnected ideas about gender roles, identity, socialization, inequality, and power. These ideas demand more than recall of definitions, because students must analyze relationships among social structures and link theory to lived experience. When the first topics of SOCIO 102 are learned through lecture and memorization alone, students tend to retain isolated definitions without seeing how

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concepts connect (Almulla and Alamri 2021). In Sex, Gender, and Sexuality, students must separate terms that everyday speech uses interchangeably. In Gender and Sexuality Across Time, they must trace changing ideas about gender from pre-colonial to contemporary Philippine society. In Anatomy and Physiology of Reproduction, they must relate biological processes to the social meanings attached to the body.

The academic readiness of entering college students adds urgency. In the 2022 Programme for International Student Assessment, Filipino 15-year-olds scored 347 in reading, 355 in mathematics, and 355 in science, placing the country among the lowest performers of 81 participating countries and economies (OECD 2023). These learners are now entering first-year programs. At the research locale, general education lessons are delivered through self-learning modules, and Philippine studies on modular instruction report that many students struggle to study alone without a teacher's guidance (Dangle and Sumaoang 2020). The modules therefore need activities that help students organize concepts and learn from one another.

Collaborative Concept Mapping (CCM) responds to this need. Students identify key concepts, arrange them visually, connect them with labeled links, and negotiate meaning with peers. A meta-analysis of 78 experimental studies found a strong positive effect of concept maps on academic achievement (Izci and Acikgoz Akkoc 2024), and a meta-analysis of 68 studies found that collaborative mapping produced larger effects than individual mapping (Han 2025). Beyond mapping, a meta-analysis of 104 studies with 15,896 college students in the humanities and social sciences showed that active learning outperformed lecturing by about half a standard deviation, with larger gains in sociology (Kozanitis and Nenciovici 2023).

Despite this evidence, concept mapping research has concentrated on science, technology, engineering, and mathematics (Almulla and Alamri 2021), and local studies on collaborative learning have focused on basic education and science subjects (Gaad 2022). No study at the research locale had examined how CCM affected performance across specific Gender and Society topics or how students experienced it. This study addressed that gap by determining the pretest and posttest performance of first-year Customs Administration students in three topics of SOCIO 102, testing whether the difference was significant, and exploring their experiences of the strategy. The findings served as the basis for enhancing the lessons in the course's self-learning module.

Four frameworks guided the study. Generative Learning Theory holds that learners understand best when they select, organize, and integrate information with prior knowledge, and it identifies mapping as a generative strategy (Fiorella and Mayer 2016). The ICAP Framework predicts that learning deepens as engagement moves from passive to active, constructive, and interactive modes (Chi and Wylie 2014). Collaborative Cognitive Load Theory explains that groups can share the load of complex tasks but also incur coordination costs (Kirschner et al. 2018). Constructive Alignment Theory requires intended outcomes, learning activities, and assessments to be deliberately connected (Biggs et al. 2022).

Statement of the problem

This study determined the effectiveness of CCM as a teaching strategy in Gender and Society among first-year Bachelor of Science in Customs Administration students as a basis for an enhanced self-learning module in SOCIO 102. Specifically, it sought to answer the following questions:

1. What is the pretest performance of the students before the integration of concept mapping in Sex, Gender, and Sexuality; Gender and Sexuality Across Time; and Anatomy and Physiology of Reproduction?

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2. What is the posttest performance of the students in the same topics after the integration of the strategy?
3. Is there a significant difference between the pretest and posttest scores of the students?
4. What are the experiences of the students regarding the integration of concept mapping in teaching Gender and Society?
5. Based on the findings, what enhanced self-learning module in SOCIO 102 can be presented?

METHODOLOGY

The study used an explanatory sequential mixed-method design, in which quantitative data were collected and analyzed first and qualitative data were gathered afterward to explain the results (Creswell and Creswell 2023). The quantitative phase was a quasi-experimental one-group pretest–posttest design, because random assignment was not possible with an intact class. The qualitative phase was a focus group discussion conducted after the posttest. This design carries threats to internal validity, namely history, maturation, and testing effects. To limit them, the study ran within a short, defined instructional period, used the same validated test under comparable conditions, and introduced no other intervention related to the topics.

The study was conducted at the University of Cebu Lapu-Lapu and Mandaue, Mandaue City, Cebu, in the first semester of School Year 2026–2027. The respondents were all 45 students of one intact first-year section of the Bachelor of Science in Customs Administration program, selected through convenience sampling based on the researcher's teaching assignment. Of these, 29 (64.4%) were male and 16 (35.6%) were female. All 45 took the pretest, participated in the mapping activities, and took the posttest. For the FGD, five students were purposively selected, one from each of the five mapping groups, on the basis of willingness to share and complete attendance. The researcher was also the class teacher.

The achievement test had 25 multiple-choice items aligned with the course competencies: nine on Sex, Gender, and Sexuality, eight on Gender and Sexuality Across Time, and eight on Anatomy and Physiology of Reproduction. A table of specifications mapped each item to a learning objective and a cognitive level of the revised Bloom's taxonomy, from remembering to evaluating. Experts validated content, and the test was pilot tested with a separate first-year section. Item analysis retained 17 items, revised six with low discrimination, and replaced two with negative discrimination. The Kuder-Richardson Formula 20 yielded a reliability coefficient of 0.78. The same test served as pretest and posttest. The FGD interview guide asked students to describe the mapping process, the parts they liked and disliked, whether the strategy helped them understand the topics, and what they would change.

CCM was integrated into the teaching of the three topics for three hours each. Every topic followed the same sequence: activating prior knowledge, individual brainstorming, pooling and sorting concepts in groups, building the map on manila paper with labeled links, checking and refining the map, presenting it to the class, and whole-class synthesis with teacher feedback. The class was divided into five groups of nine members.

Permission was obtained from university officials before data collection. Participation was voluntary, and students signed informed consent forms after being told the purpose, procedures, risks, benefits, and their right to withdraw without penalty; parental consent and student assent were secured for respondents below 18 years old. Because the researcher was also the teacher, students were assured that participation, scores, and FGD responses would not affect their grades. The pretest was given before the intervention and the posttest after it. The FGD lasted about 40 minutes, was audio-recorded with separate consent, and allowed answers

in English or Cebuano. Cebuano responses were translated into English, and participants were identified only as Student 1 to Student 5. Records were stored securely in compliance with the Data Privacy Act of 2012 (Republic Act No. 10173). The study received no external funding, and the only potential competing interest is that the researcher was also the class teacher.

Raw scores were converted to percentages and interpreted using a five-level scale adapted from the K to 12 grading scale: Outstanding (90–100), Very Satisfactory (85–89), Satisfactory (80–84), Fairly Satisfactory (75–79), and Did Not Meet Expectations (below 75). Frequency, percentage, mean, and standard deviation described performance. The Shapiro-Wilk test showed that pretest–posttest differences were not normally distributed, so the Wilcoxon signed-rank test, the non-parametric counterpart of the paired t-test, was used at the .05 level, with rank-biserial correlation as the effect size. FGD transcripts were analyzed using the six phases of reflexive thematic analysis (Braun and Clarke 2022).

RESULTS AND DISCUSSION

Before the intervention, the class mean fell at the Did Not Meet Expectations level in all three topics. In Sex, Gender, and Sexuality, the mean was 4.22 of 9 (46.91%, SD = 1.78), and 40 of 45 students (88.89%) were at this level. In Gender and Sexuality Across Time, the mean was 4.11 of 8 (51.39%, SD = 1.67), with 35 students (77.78%) at this level. In Anatomy and Physiology of Reproduction, the mean was 4.11 of 8 (51.39%, SD = 1.58), with 36 students (80.00%) at this level. The overall mean was 12.44 of 25 (49.78%, SD = 4.09), and 41 students were at the lowest level.

After the intervention, the class mean in every topic rose to the Fairly Satisfactory level: 7.16 (79.51%, SD = 1.35) in Sex, Gender, and Sexuality, 6.11 (76.39%, SD = 1.50) in Gender and Sexuality Across Time, and 6.16 (76.94%, SD = 1.36) in Anatomy and Physiology of Reproduction. The overall mean rose to 19.42 (77.69%, SD = 3.41), a gain of 27.91 percentage points. The number of students at the lowest level dropped to 13 (28.89%), 17 (37.78%), and 10 (22.22%) in the three topics, respectively, and to 17 in the overall test. Sex, Gender, and Sexuality showed the largest gain (32.60 percentage points) and Gender and Sexuality Across Time the smallest (25.00). No topic reached the Satisfactory level on average.

The Wilcoxon signed-rank test showed that posttest scores were significantly higher than pretest scores in Sex, Gender, and Sexuality (mean difference = 2.94, $z = -5.82$), Gender and Sexuality Across Time (mean difference = 2.00, $z = -5.70$), Anatomy and Physiology of Reproduction (mean difference = 2.05, $z = -5.55$), and the overall test (mean difference = 6.98, $z = -5.91$), all at $p < .001$. The null hypothesis was therefore rejected in each case. No student scored lower on the posttest in the first and second topics or in the overall test, and only two students scored lower in the third topic. Tied pairs were excluded (1 in the first topic and 3 each in the second and third topics). Rank-biserial correlations of 0.97 to 1.00 indicate very large effects.

Four themes emerged. First, students described mapping as a way of seeing how ideas fit together. Student 3 said the arrows helped organize ideas about the lesson, Student 1 said the map e-arrange ang whole topic (arranges the whole topic), and Student 5 said the activity was better than discussion alone because it ma-refresh jud permi (keeps refreshing our memory).

Second, all five participants valued learning together. They heard others' opinions, combined ideas into a better map, and felt comfortable sharing within the group. Student 3 described looking at classmates' opinions because they knew things that Student 3 had not noticed, and the group combined them into a better map.

Third, students reported difficulties. Presentation was the hardest part for several of them. Student 5 observed that groupmates shared freely during brainstorming but became shy

when presenting, so Student 5 stepped up to present, and Student 3 worried about a presenter who was easily distracted. Student 4 reported that some groupmates dismissed ideas with Oi lisod mana, dili lang ta ana (Oh, that is hard, let us not do that), which was hurtful. Student 1 found individual brainstorming difficult.

Fourth, all participants wanted the strategy to continue. Student 4 suggested changing the groupings, and Student 5 preferred that maps be made in school because at home students would simply look them up online.

The students began all three topics at the Did Not Meet Expectations level and ended at the Fairly Satisfactory level, with significant and very large gains. This pattern agrees with meta-analytic evidence that concept maps raise achievement (Izci and Acikgoz Akkoc 2024) and that collaborative use yields larger effects than individual use (Han 2025). It also agrees with evidence that active instruction benefits college students in the humanities and social sciences, especially in sociology (Kozanitis and Nenciovici 2023), and with a Philippine study that found significant gains after collaborative learning using a one-group pretest–posttest design (Gaad 2022).

The largest gain in Sex, Gender, and Sexuality is consistent with the view that maps make relationships among concepts explicit through linking words, which helps learners avoid confusing related terms (Novak and Cañas 2008). Placing sex, gender, sexual orientation, and gender identity on one map and labeling their connections is likely to have made their differences visible. In Generative Learning Theory terms, students selected key concepts, organized them, and integrated them with prior knowledge (Fiorella and Mayer 2016). The smaller gain in Gender and Sexuality Across Time suggests that content involving many periods and causal chains may need more than three hours. Han (2025) similarly reported larger effects with longer use of concept mapping. The gain in Anatomy and Physiology of Reproduction is consistent with reports that concept maps improve science achievement (Anastasiou, Wirngo, and Bagos 2024), and it suggests that mapping can connect biological and social content within one course.

The FGD helps explain these gains. Students said that arrows and linking words showed relationships and that group work let them compare and combine ideas. This matches the interactive mode of the ICAP Framework, in which learners build on one another's contributions (Chi and Wylie 2014), and it echoes findings that peer interaction strengthens collaborative learning and performance (Qureshi et al. 2023) and that collaborative mapping builds both individual and group knowledge (Lailiyah and Yustisia 2022). The difficulties students described are consistent with Collaborative Cognitive Load Theory, which warns that coordination costs can outweigh the benefits of group work when roles and procedures are not structured (Kirschner et al. 2018). Fear of being judged is also a recognized source of stress in oral presentations among higher education students (Grieve et al. 2021). The dismissal of ideas by groupmates may have silenced some students, and this may partly explain why 17 students remained at the lowest level after the posttest, although the data cannot confirm this link.

Several limitations qualify these conclusions. The design had no control group, so history, maturation, and testing effects cannot be ruled out, and the same test was used before and after the intervention. The researcher was also the teacher of the class, which may have influenced both teaching and responses despite the assurances given. Respondents came from one intact section selected by convenience, and only five students took part in the FGD, so the findings may not generalize to other programs or institutions. The intervention covered only three topics at three hours each, and long-term retention was not measured. For these reasons, the results are best read as strong evidence of improvement associated with CCM rather than proof that CCM alone caused it.

The findings have practical implications. Teachers who use CCM may form groups that mix prior achievement levels, assign rotating roles, set norms for respectful discussion, provide guide questions for individual brainstorming, and keep the mapping in class. Content with chronological structure may benefit from timeline-based maps and additional time. Module developers may write these supports into self-learning materials so that students are guided in organizing content rather than reading alone, a need already noted for modular instruction (Dangle and Sumaoang 2020). These considerations informed the enhanced self-learning module developed as the output of the study.

CONCLUSION

Collaborative Concept Mapping was an effective strategy for teaching Gender and Society to first-year college students in this study. Performance improved significantly from the Did Not Meet Expectations level to the Fairly Satisfactory level across all three topics, and students reported that the strategy helped them see connections among ideas and learn from one another. The strategy worked best when group work was well structured, since uneven participation and presentation anxiety limited its benefits for some students.

Teachers of Gender and Society may integrate CCM with structured group roles, norms, guide questions, and rotating presenters, and may allow more time for topics with complex historical content. Course developers may incorporate in-class mapping tasks and follow-up review activities into self-learning modules. Future researchers are encouraged to test the strategy using a control group, a longer implementation period, larger and more varied samples, and other topics in Gender and Society, and to measure retention.

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