SCIENCE TEACHERS' READINESS TO TEACH EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)

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Background

Sustainable Development Goals (SDG's) through education (ESD)

The importance of ESD to create a prosperous society

Incorporating ESD Into Educational Curriculum

The teacher's role as a facilitator of ESD learning

PROBLEM

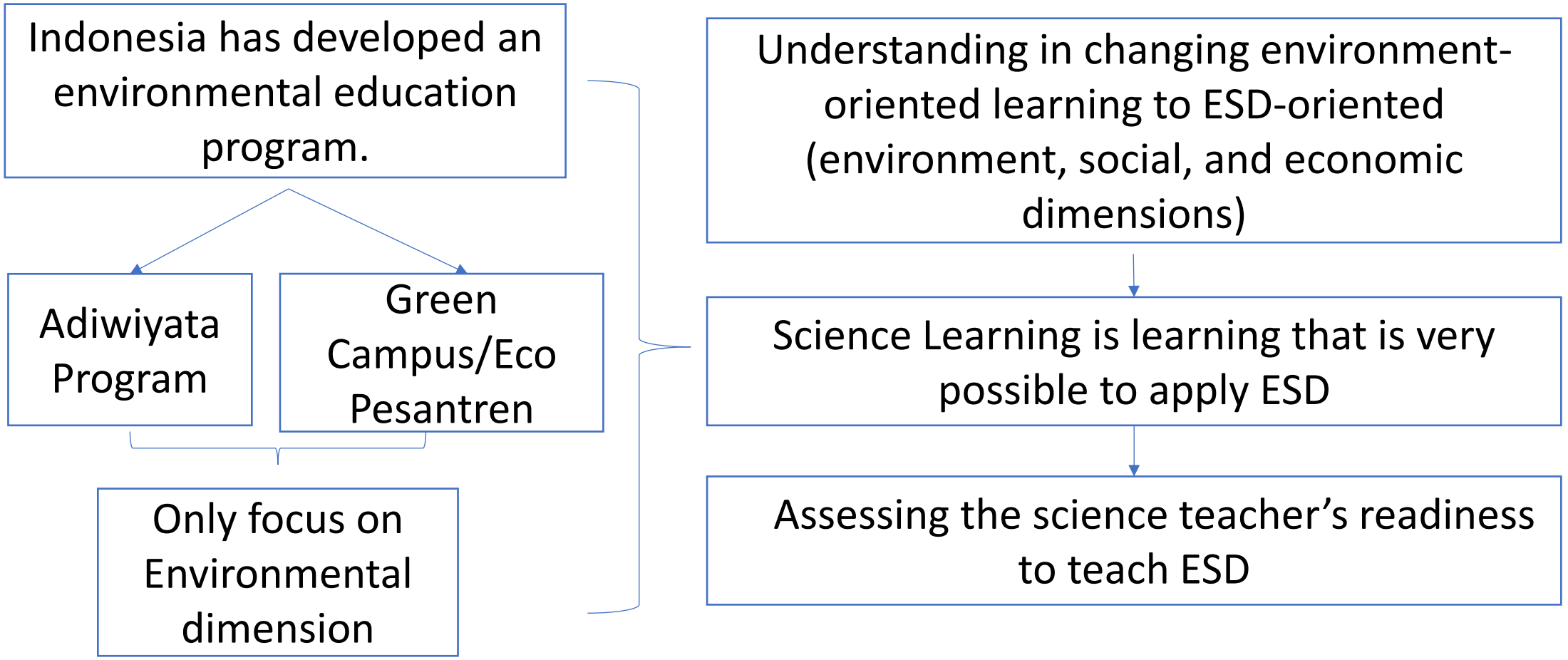
There is no teacher who specifically teach ESD in Indonesia

Not many countries integrate ESD into their learning curriculum (Garner et al., 2015)

Indonesia's policies and curriculum implementation are not yet optimal in supporting ESD

Lack of teacher's professional skill to teach ESD

Background


Indonesia has developed an environmental education program.
Adiwiyata Program
Green Campus/Eco Pesantren
Only focus on Environmental dimension
Understanding in changing environment-oriented learning to ESD-oriented (environment, social, and economic dimensions)
Science Learning is learning that is very possible to apply ESD
Assessing the science teacher's readiness to teach ESD

Science Teacher Competencies to Teach ESD

ESD teacher competencies (UNESCO, 2020)

Science Teacher competencies

Science teacher competencies to teach ESD

1. Content Knowledge
2. Content Pedagogy
3. Inquiry
4. Professional Practice
5. Evaluation and Assessment
6. Professional Development
7. Attitude

Method

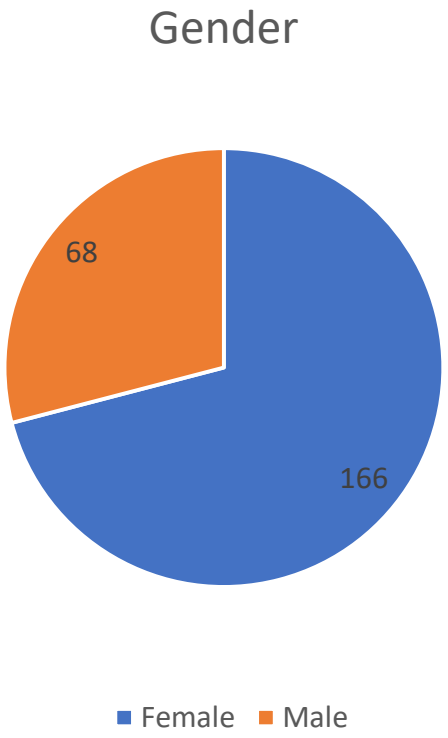
Descriptive
Quantitative

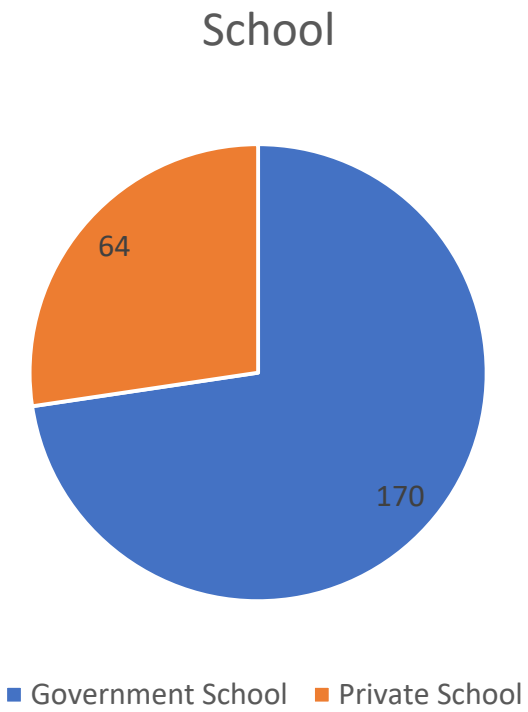
Survey

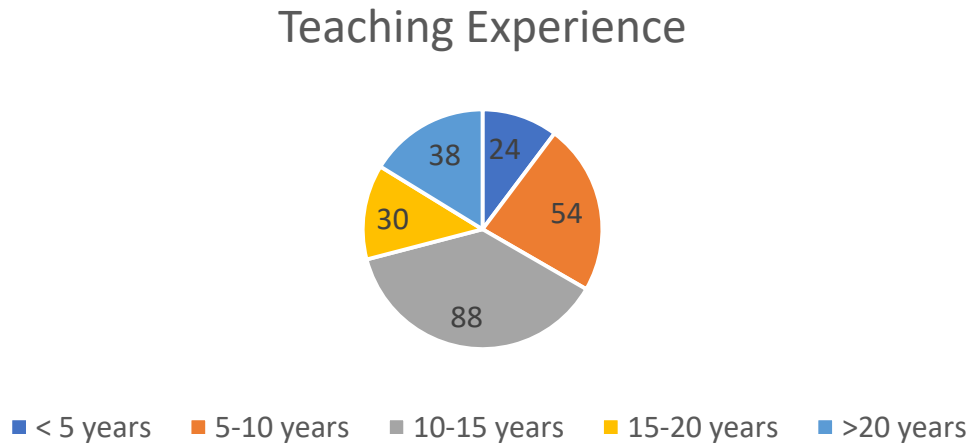
Purposive
Sampling

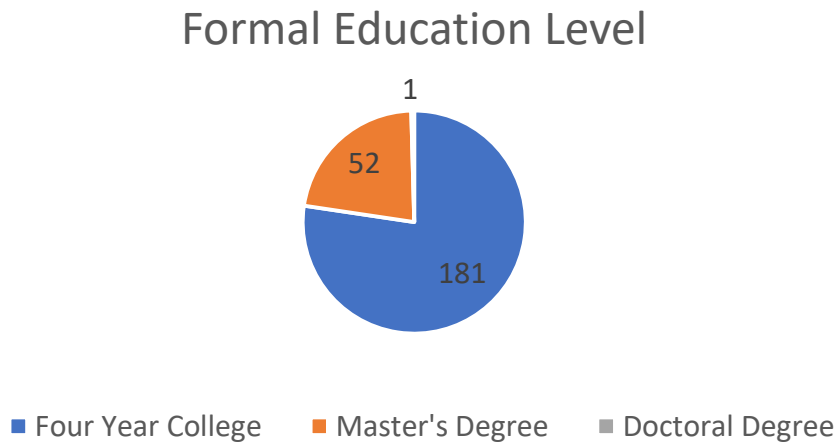
4-point scale

General Profile of Respondents



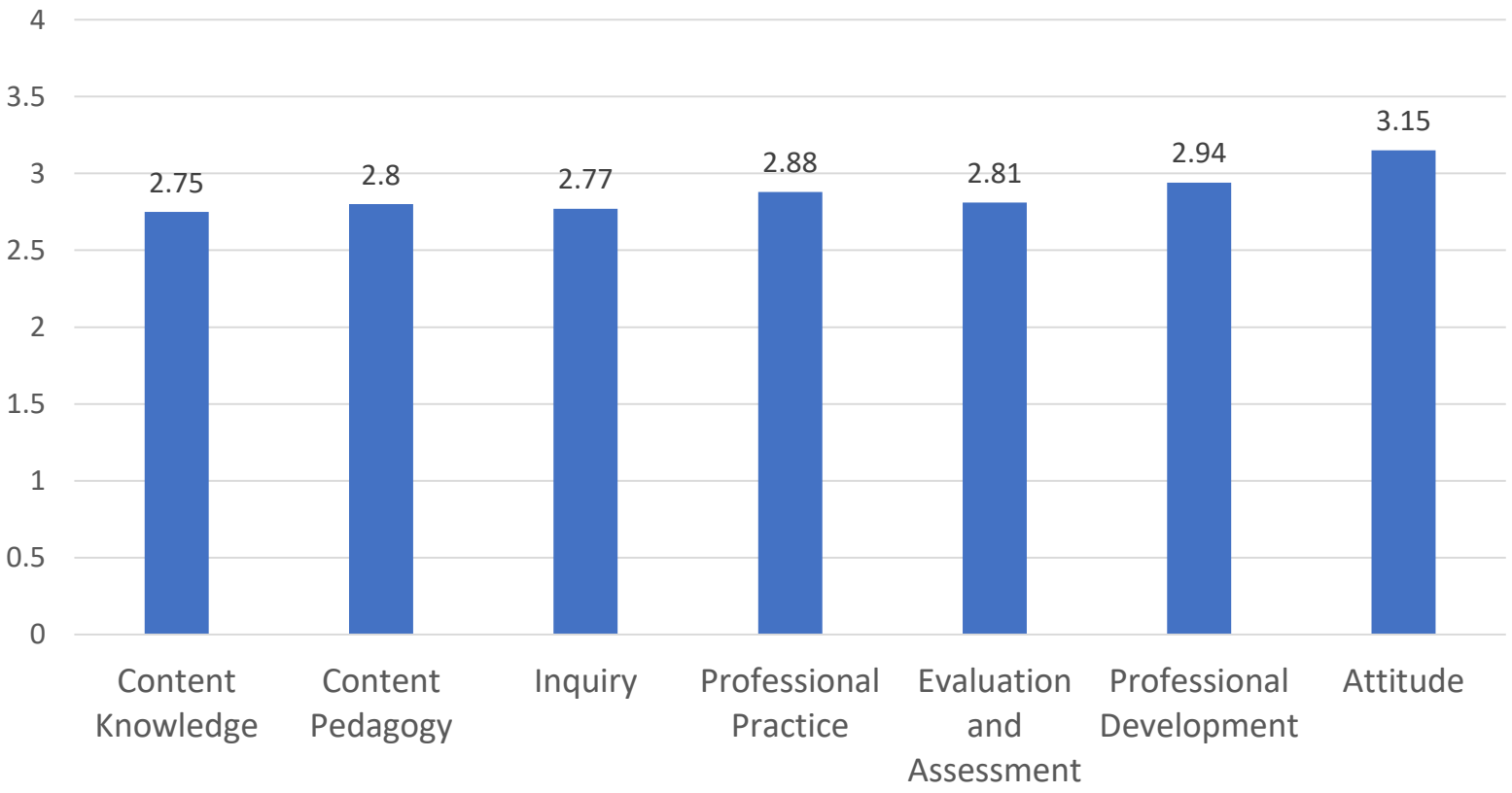






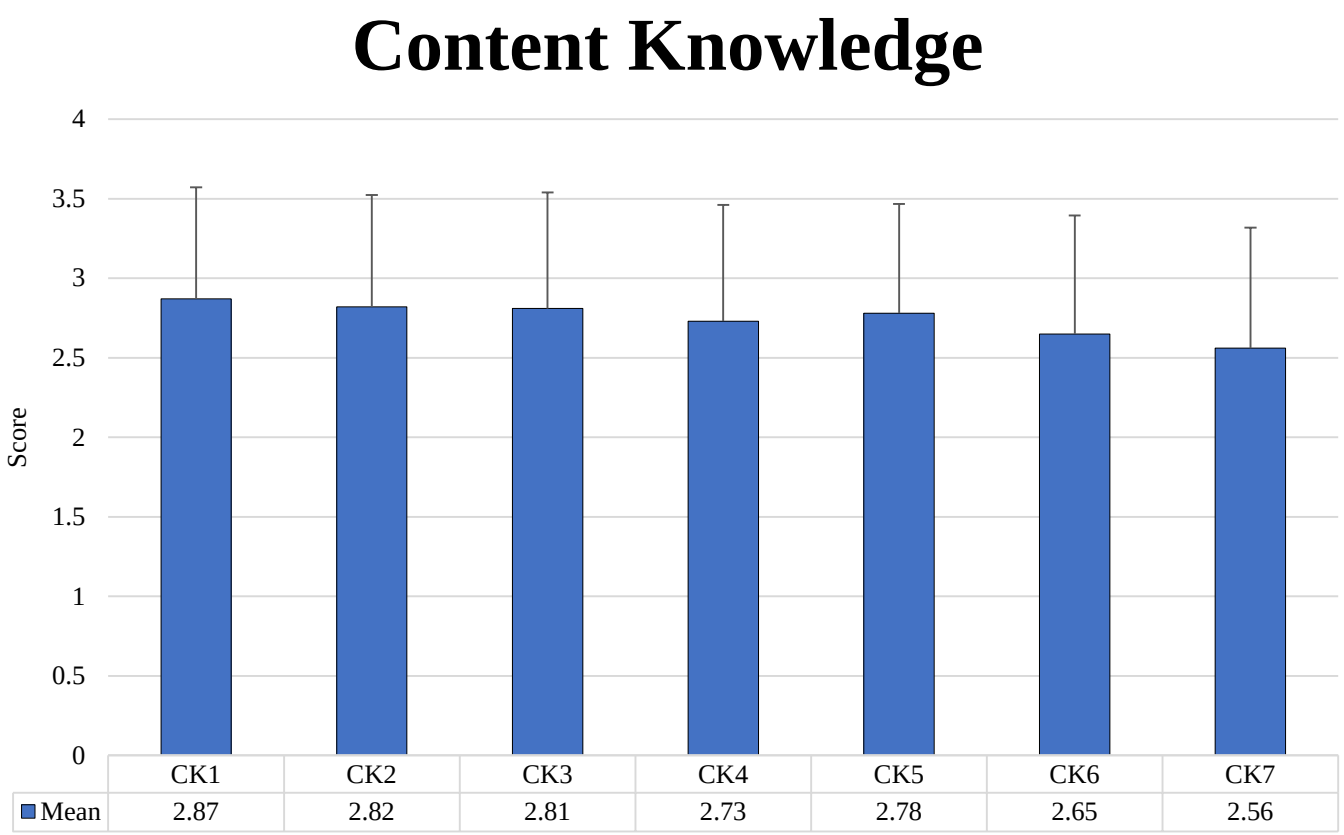
Science Teacher's Readiness To Teach ESD

Scale 1-4



Teachers are not really ready to teach ESD

Science Teacher's Readiness To Teach ESD



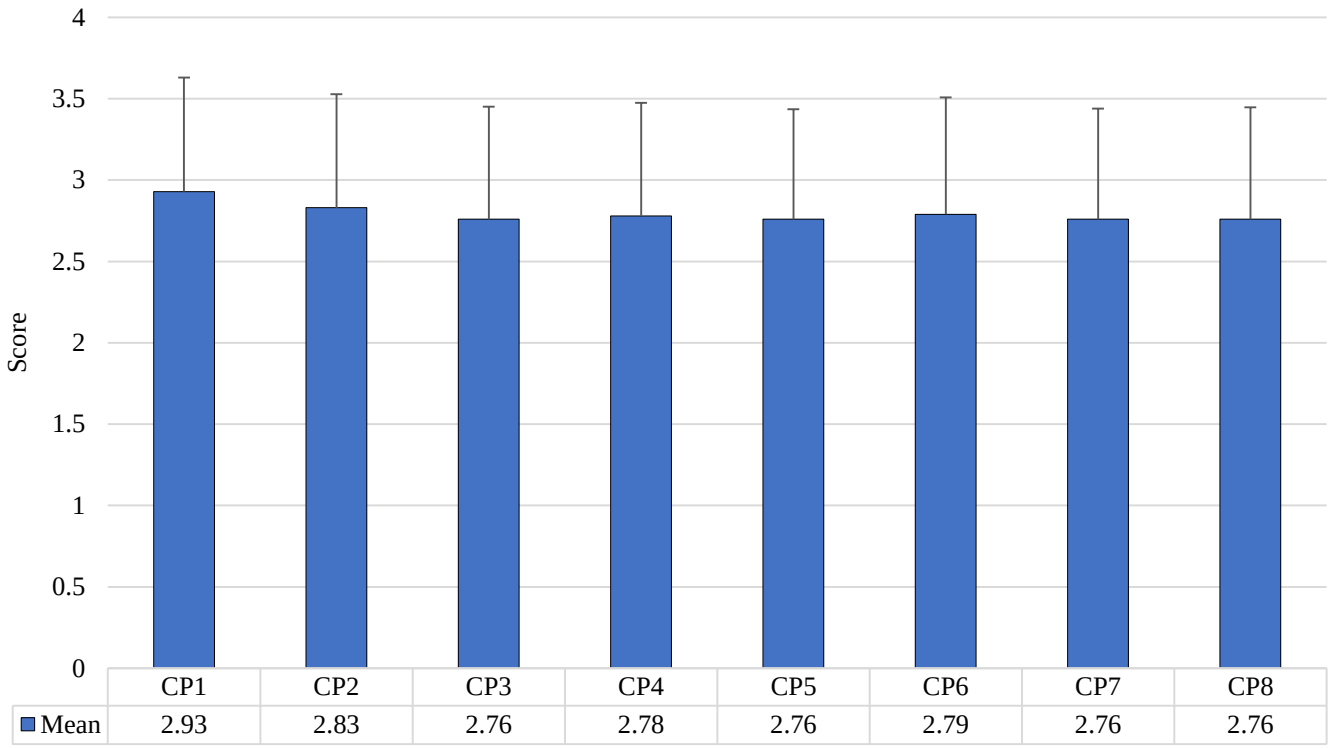
Scale 1-4

CK1	Understand the ESD content in the science curriculum.
CK2	Understand science concepts and the application on sustainability
CK3	Apply science concepts to solve problems in the sustainability domain.
CK4	Develop ESD enriched science materials by considering science curriculum.
CK5	Explain science knowledge systematically and its implication on ESD by considering the level of students' abilities and competencies
CK6	Demonstrate a critical understanding of ESD developments in the science curriculum.
CK7	Demonstrate science knowledge to creatively and innovatively process ESD content.

Teachers are not ready in all aspects of content knowledge.

Science Teacher's Readiness To Teach ESD

Content Pedagogy



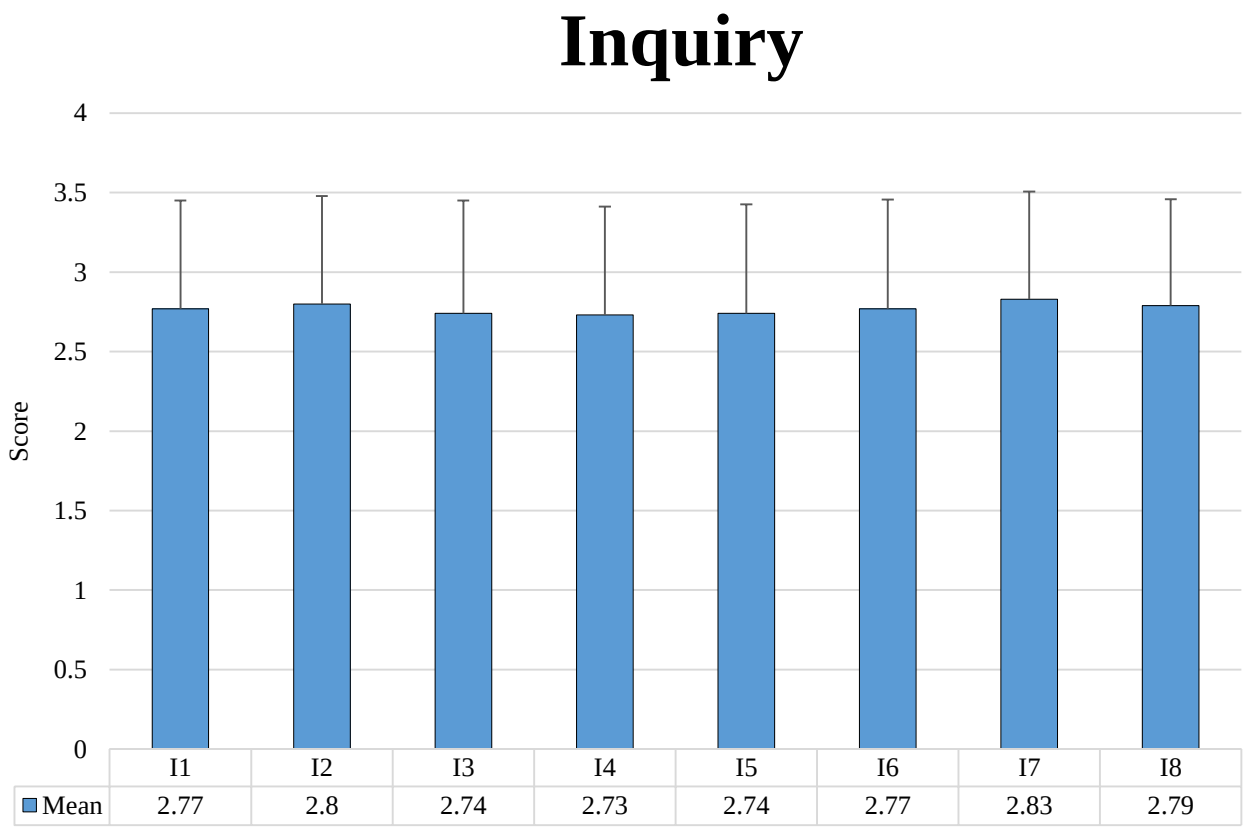
	CP1	CP2	CP3	CP4	CP5	CP6	CP7	CP8
Mean	2.93	2.83	2.76	2.78	2.76	2.79	2.76	2.76

Scale 1-4

CP1	Set the learning objectives for science learning towards sustainability.
CP2	Plan a relevant teaching strategy for science learning and its implication on sustainability.
CP3	Plan ESD enriched science lesson by considering the level of students' abilities and competencies.
CP4	Plan well-structured activities for exploring science concepts and its application on sustainability.
CP5	Align the learning objectives and assessment type to evaluate ESD enriched science lesson.
CP6	Integrate specific technologies in ESD enriched science learning to support students' conceptual understanding
CP7	Understand student's background and characteristics to teach meaningful science lesson in the context of ESD.
CP8	Modify science lesson for sustainability when faced with unexpected conditions.

Teachers are not ready in all aspects of content pedagogy.

Science Teacher's Readiness To Teach ESD



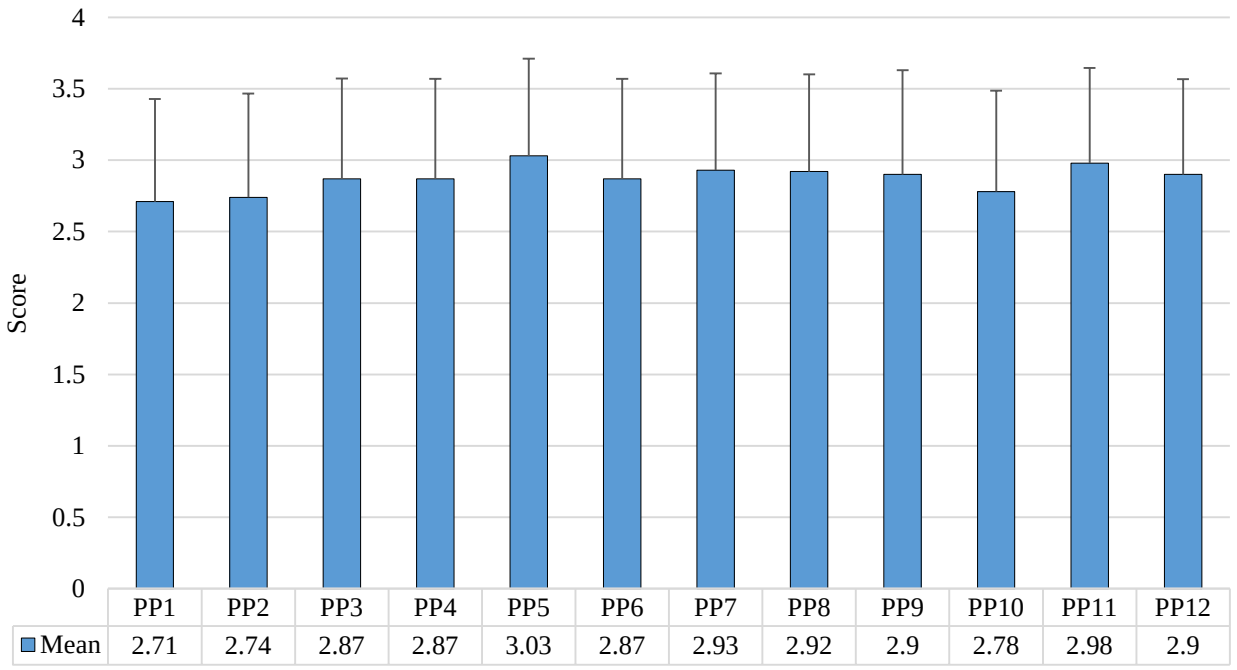
Scale 1-4

I1	Ask questions about sustainability issues and engage students to solve them by doing scientific investigations.
I2	Stimulates to make hypotheses based on scientific questions in ESD enriched science learning.
I3	Plan and conduct scientific investigations to solve ESD problems.
I4	Use engineering practices to support scientific investigations in solving ESD problems.
I5	Ability to develop students' scientific thinking competence and students' scientific problem-solving competence for lifelong learning.
I6	Synthesize a scientific explanation by using evidence and data on science experiment for sustainability.
I7	Generate class discussions to conclude the analysis of scientific investigation related to ESD in science learning.
I8	Report scientific investigations in solving ESD problems after conducting science experiments.

Teachers are not ready in all aspects of inquiry.

Science Teacher's Readiness To Teach ESD

Professional Practice



	PP1	PP2	PP3	PP4	PP5	PP6	PP7	PP8	PP9	PP10	PP11	PP12
Mean	2.71	2.74	2.87	2.87	3.03	2.87	2.93	2.92	2.9	2.78	2.98	2.9

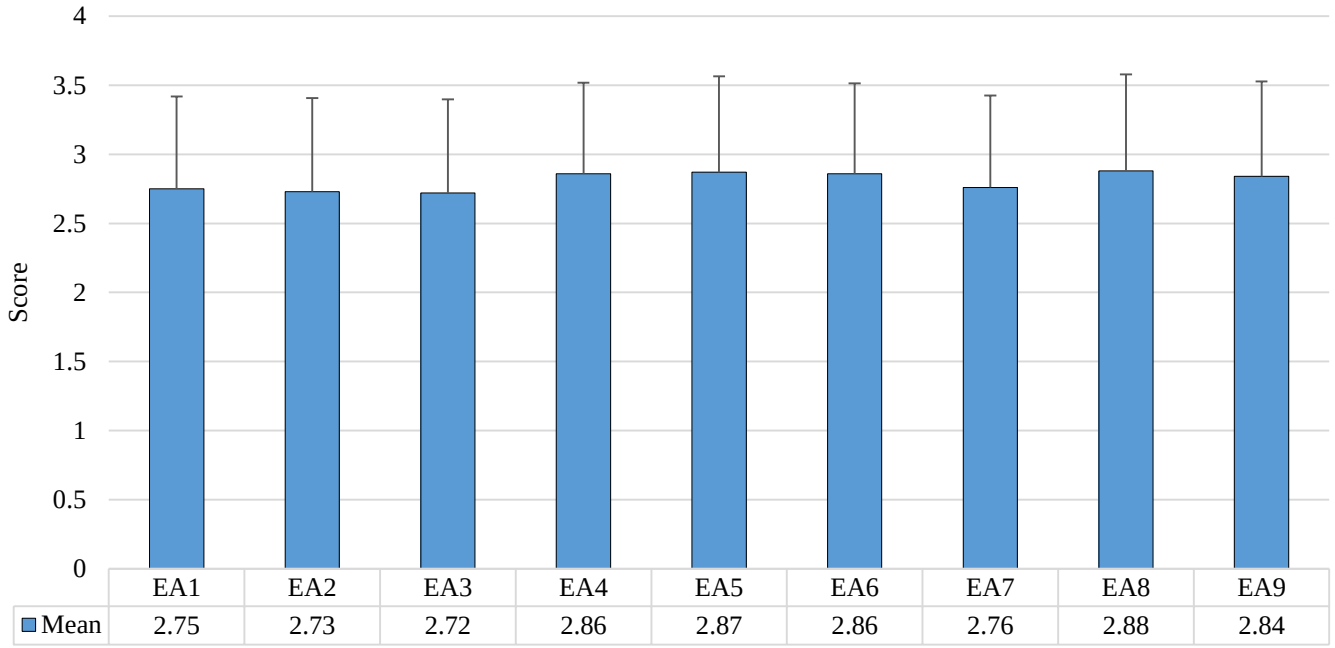
Scale 1-4

Teachers are not ready in all aspects of professional practice.

PP1	Design an effective science lesson by embedding ESD.
PP2	Use appropriate technology to enhance ESD enriched science lessons and facilitate students' learning
PP3	Plan effective use of lab equipment in ESD embedded science teaching.
PP4	Create a constructivist learning environment in science lessons by fostering transdisciplinary and cross-sectoral engagement for a sustainable future
PP5	Able to interact with students collaboratively by producing ethically safe work in science lessons
PP6	Adapt teaching to respond to sustainability in science lessons by considering students' need.
PP7	Encourage students to take responsibility for maintaining ways to solve ESD problems in science learning
PP8	Practice a sustainable way of life by managing the behaviour effectively in science lessons
PP9	Pays attention to all learners in learning science by embedding ESD
PP10	Challenge students to optimize the strategy for maintaining sustainability in science learning
PP11	Facilitate student to demonstrate safe technique and generate ethical safe working
PP12	Cultivate students' critical awareness about the social changes that arise from the integration of ESD

Science Teacher's Readiness To Teach ESD

Evaluation and Assessment



	EA1	EA2	EA3	EA4	EA5	EA6	EA7	EA8	EA9
Mean	2.75	2.73	2.72	2.86	2.87	2.86	2.76	2.88	2.84

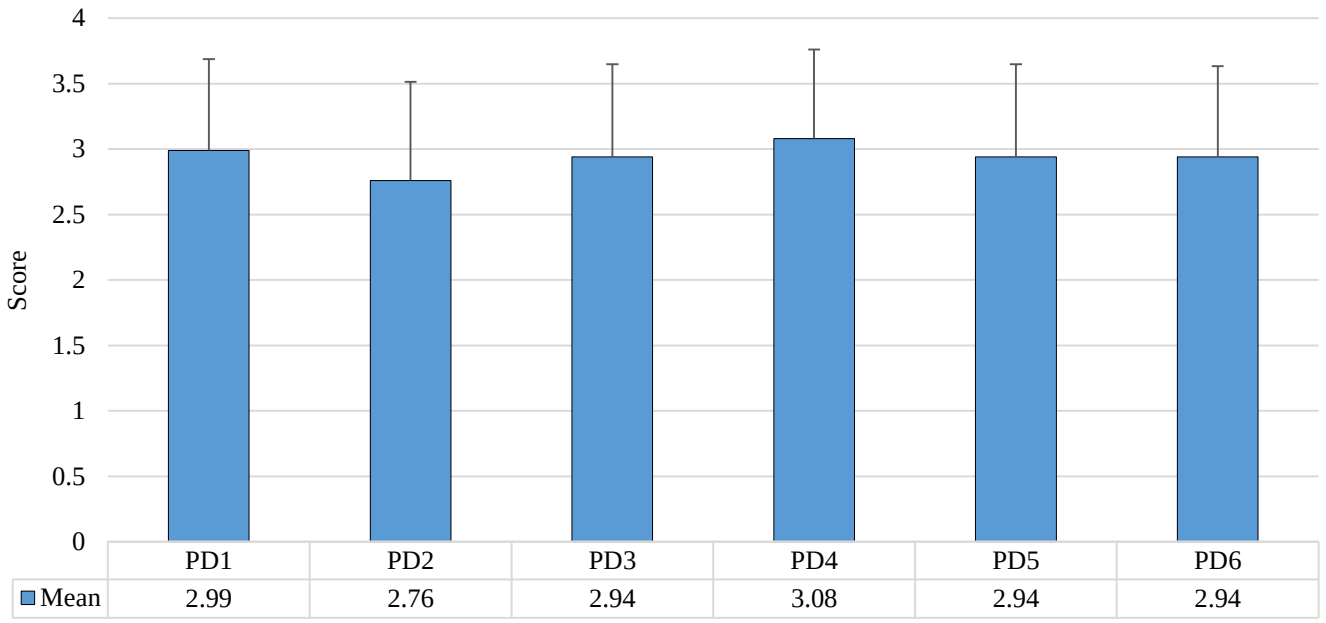
Scale 1-4

Teachers are not ready in all aspects of evaluation and assessment

EA1	Develop assessments appropriate for science lessons by embedding ESD
EA2	Monitor students' understanding of ESD-enriched science lessons through different types of assessments.
EA3	Implement various types of assessment based on learning objectives in ESD enriched science lessons.
EA4	Use formative and summative assessment to evaluate students' progress in science learning and its implications on sustainability
EA5	Evaluate the prior knowledge of students according to ESD issues in science lessons
EA6	Engage in continuous critical reflection to improve ESD enriched science teaching and learning.
EA7	Analyze and evaluate the practice of integrating ESD in science learning.
EA8	Provide feedback to help students understand ESD enriched science learning.
EA9	Analyze and evaluate the results of the ESD-enriched science learning assessment to plan a follow-up to the next lesson.

Science Teacher's Readiness To Teach ESD

Professional Development

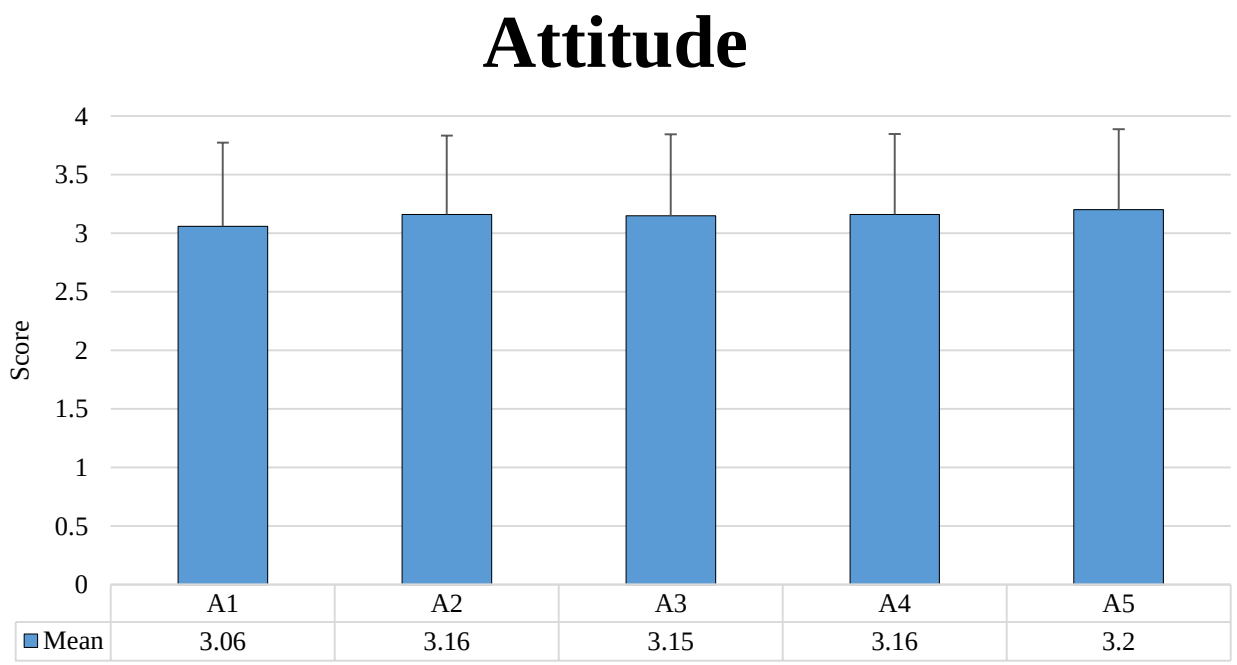


PD1	Participate in professional development opportunities to deepen and expand science content knowledge and ESD practices.
PD2	Become an agent of change by promoting ESD-based science learning
PD3	Collaborate with peers and stakeholder to improve the quality of ESD-based science learning.
PD4	Collect student feedback on ESD-enriched science teaching and learning to improve and follow up on future lessons.
PD5	Identify action plans for continuous improvement in the integration of ESD in science learning
PD6	Communicate effectively with stakeholders to support ESD based science teaching and learning.

Scale 1-4

Teachers are not ready in all aspects of professional development, except PD4

Science Teacher Readiness To Teach ESD



A1	Responding to social, economic, and environmental changes by being involved in communities and society in realizing ESD-based science learning.
A2	Have tolerance for students and science learning
A3	Demonstrate consistently the positive attitude and lifestyle
A4	Having good cooperation with students and community across culture.
A5	Have high expectations by building work discipline in achieving personal and family well-being

Scale 1-4

Teachers are fairly ready to develop attitude

Conclusion

1. Science teachers are not really ready to teach ESD
2. Science teachers have to improve the content knowledge of ESD including how to plan, design, and modify ESD content in science learning.
3. Science teachers have to improve their inquiry skills especially investigating the ESD issues relevant to science learning.

Recommendation

1. Science teachers need professional development training in incorporating ESD into science learning.
2. Introducing ESD into schools require a shift in education paradigm from content-oriented toward action-oriented

Thank You