



8th UNESCO UNITWIN International Conference on Quality Teacher Education 2023
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Developing Digital Competence and Teaching Efficacy of STEM Teachers through an Online Master Course

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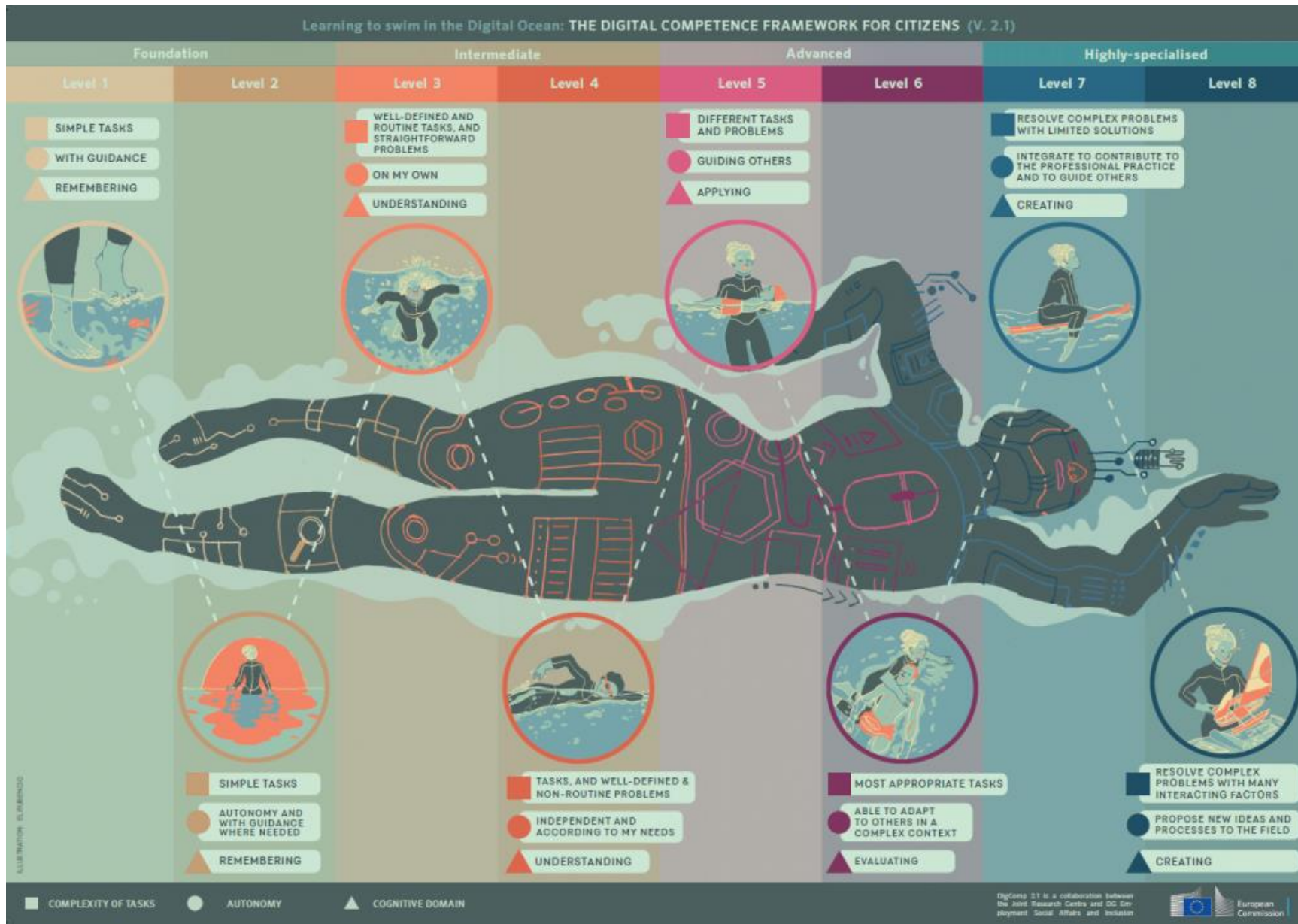
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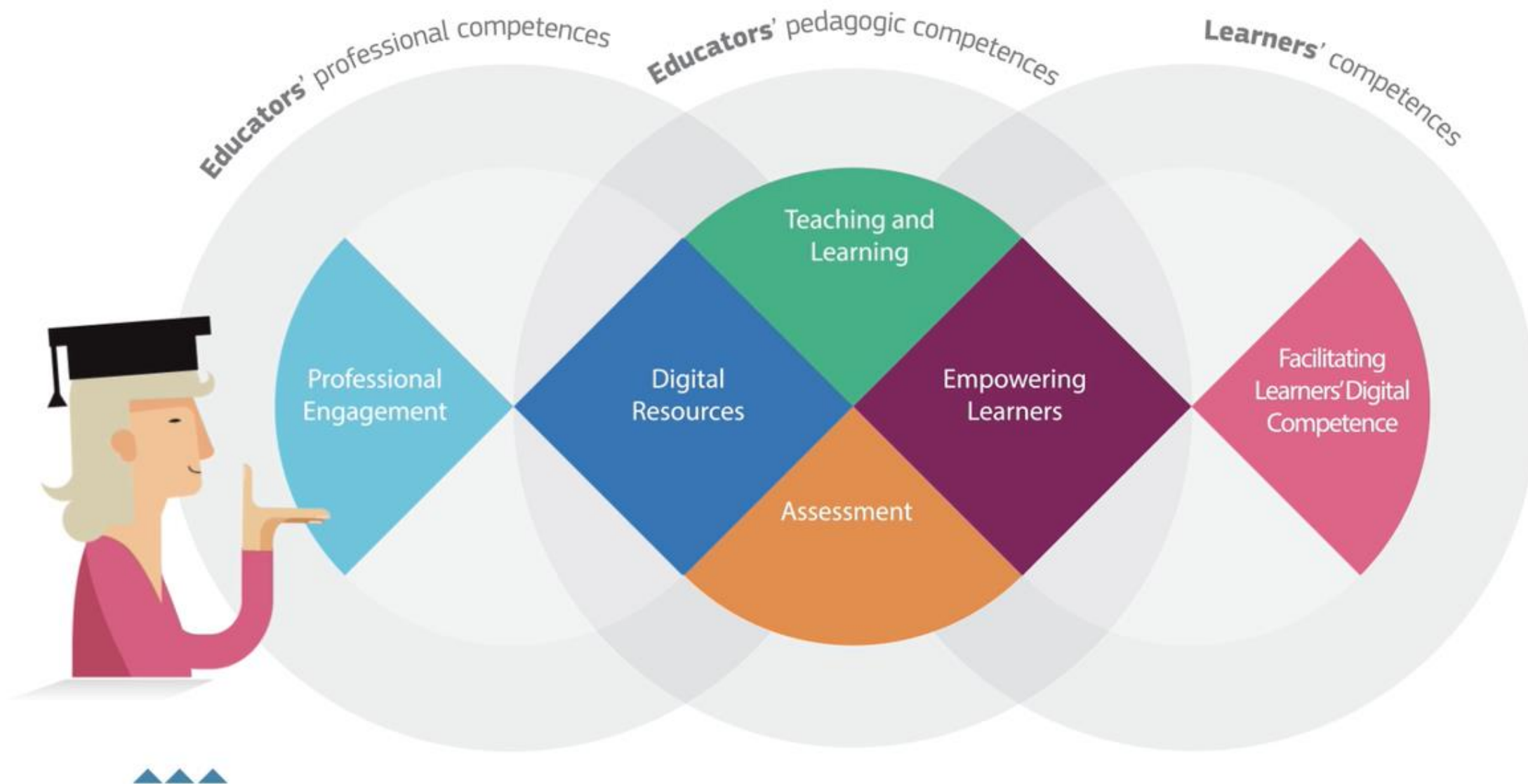
Outline

- Context of the Study - Teacher Digital Competence and Teaching Efficacy
- Development of the STEM Education Master Course
- Results of the Implementation of the STEM Education Master Course
- Conclusion and Recommendations

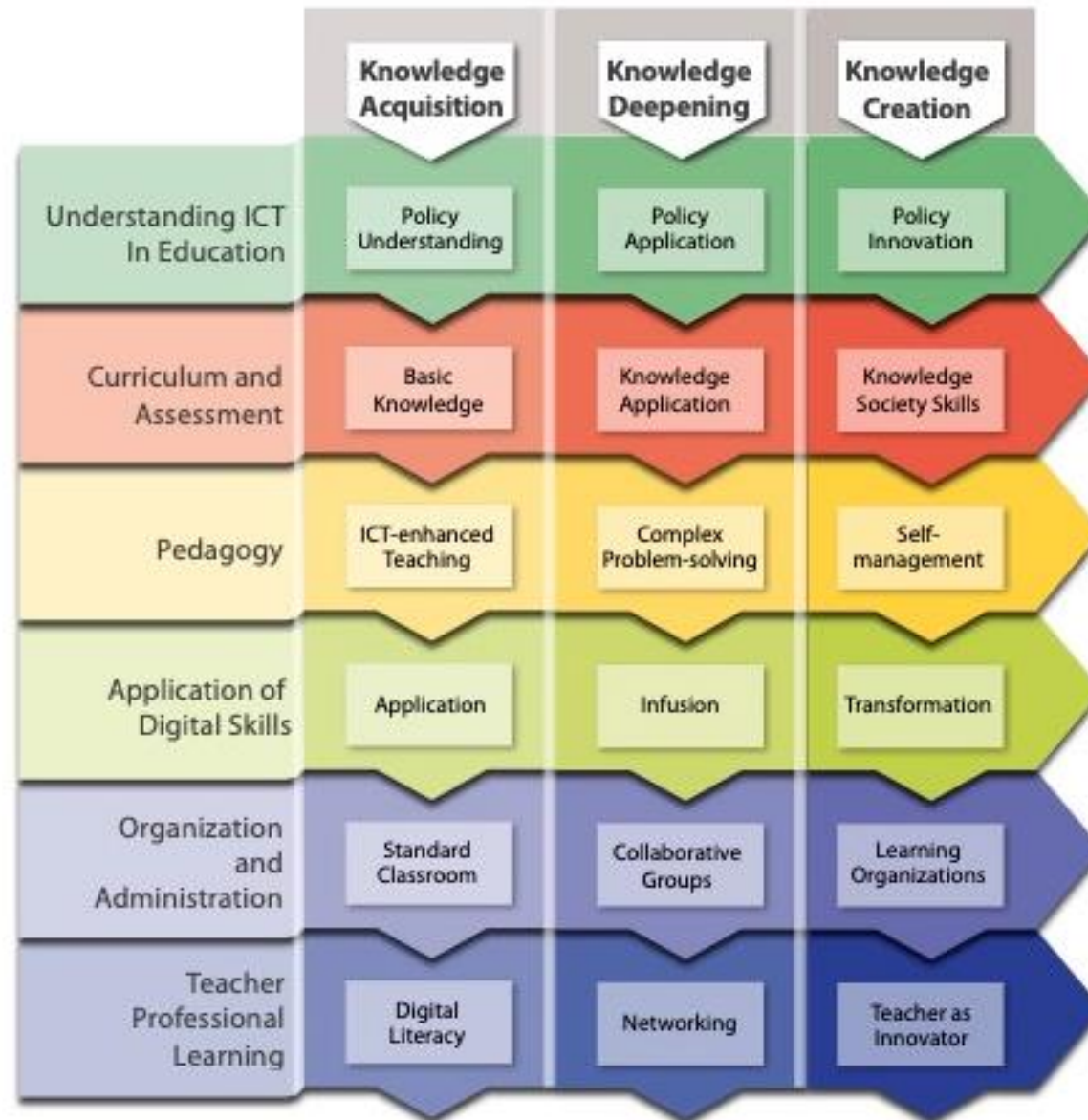
ITU Digital Competence Framework for Citizens



EU Framework for Digital Competence of Educators (DigCompEdu)



UNESCO ICT Competency Framework



Philippine Professional Standards for Teachers

Domain 1 Content Knowledge and Pedagogy

1. Content knowledge
2. Knowledge and principles of teaching and learning
3. Positive use of ICT
4. Strategies for promoting literacy and numeracy
5. Strategies for developing critical and creative thinking
6. Mother Tongue, Filipino and English in teaching and learning
7. Classroom communication strategies

Domain 2 Learning Environment

1. Learner safety and security
2. Fair learning environment
3. Management of classroom structure and activities
4. Support for learner participation
5. Promotion of purposive learning
6. Management of learner behavior

Domain 3 Diversity of Learners

1. Learners' gender, needs, strengths, interests and experiences
2. Learners' linguistic, cultural, socioeconomic and religious backgrounds
3. Learners with disabilities, giftedness and talents
4. Learners in difficult circumstances
5. Learners from indigenous groups

Domain 4 Curriculum and Planning

1. Planning and management of teaching and learning process
2. Learning outcomes aligned with learning competencies
3. Relevance and responsiveness of learning programs
4. Professional collaboration to enrich teaching practice
5. Teaching and learning resources including ICT

Domain 5 Assessment and Reporting

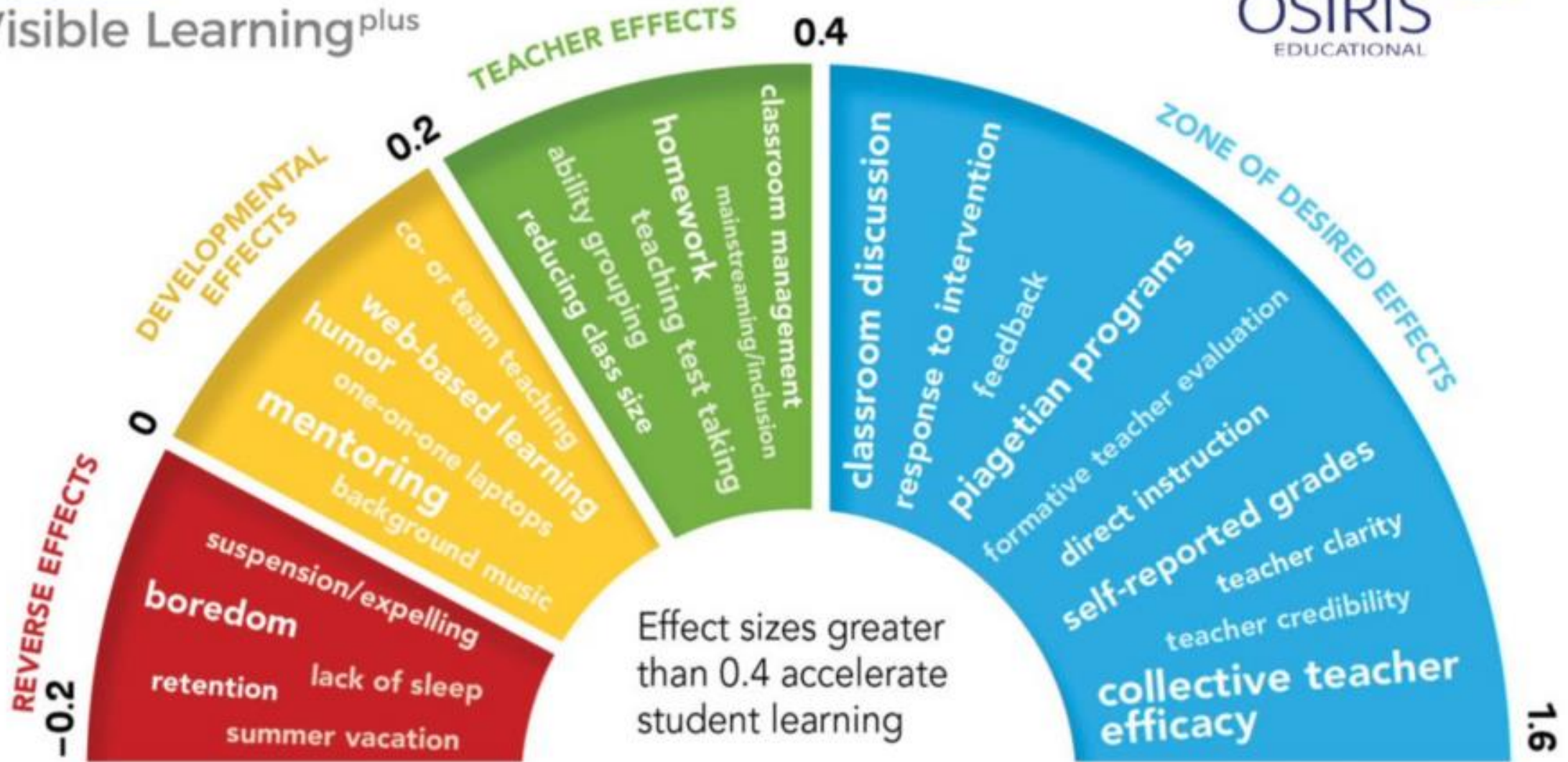
1. Design, selection, organization and utilization of assessment strategies
2. Monitoring and evaluation of learner progress and achievement
3. Feedback to improve learning
4. Communication of learner needs, progress and achievement to key stakeholders
5. Use of assessment data to enhance teaching and learning practices and programs

Domain 6 Community Linkages and Professional Engagement

1. Establishment of learning environments that are responsive to community contexts
2. Engagement of parents and the wider school community in the educative process
3. Professional ethics
4. School policies and procedures

Domain 7 Personal Growth and Professional Development

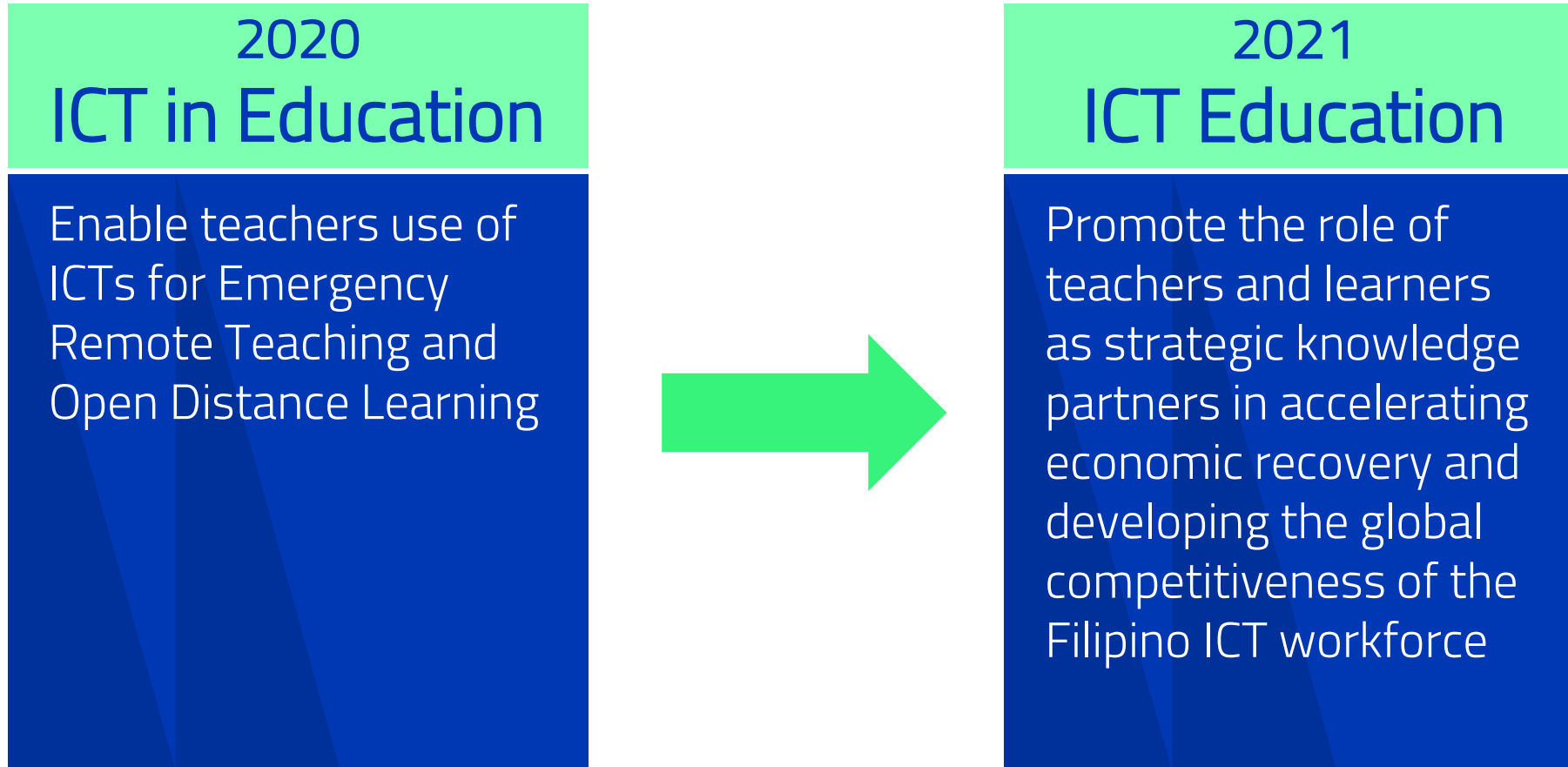
1. Philosophy of teaching
2. Dignity of teaching as a profession
3. Professional links with colleagues
4. Professional reflection and learning to improve practice
5. Professional development goals



John Hattie's latest **Visible Learning Barometer of Influences** based on 1,200 meta-analyses.

<https://visible-learning.org/2022/01/hatties-barometer-of-influence-infographic/>

Philippine DICT Reframing of ICT Education



Amidst the pandemic, the Department of Information and Communications Technology (DICT) embarked on capacity-building for digital transformation in teacher education. It partnered with the UP College of Education to develop a Master Course for STEM Teachers on Digital Competence.

STEM Education Master Course for Teachers



Information and
Data Literacy and
Inquiry-Based
Learning

Digital
Communication and
Collaboration and
Design-Based
Learning

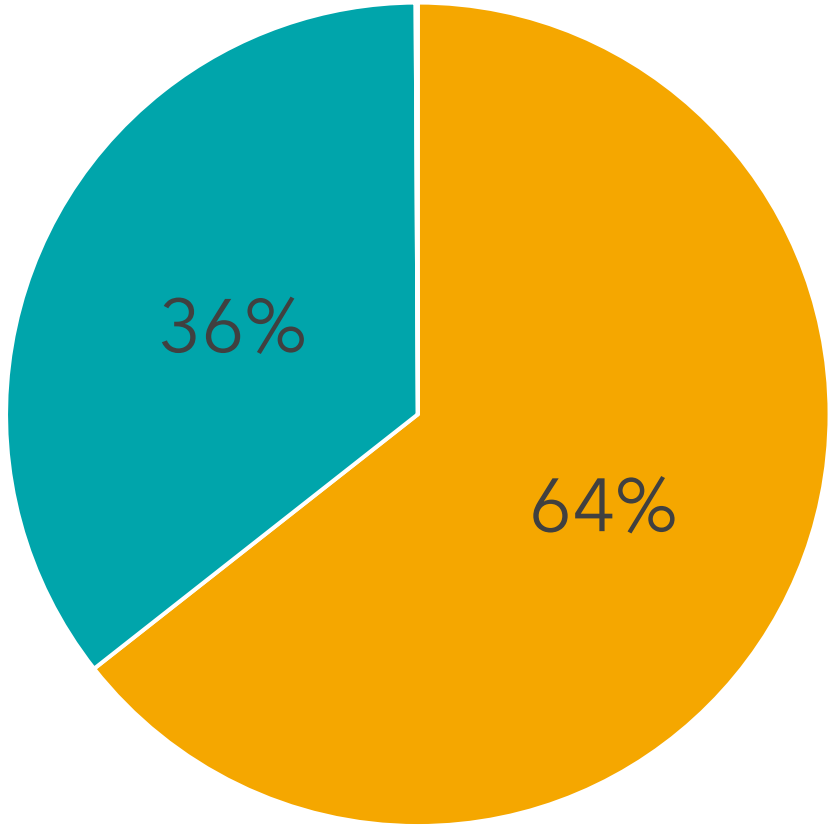
Data
Visualization and
Context-Rich
Learning

Digital Content
Creation and
Sustainability
Education



Implementation: STEM Education Master Course for Teachers

Participants



■ Females ■ Males ■ Preferred Not to Say

1132 teachers

took the course

Average years of teaching = **7.8 years**

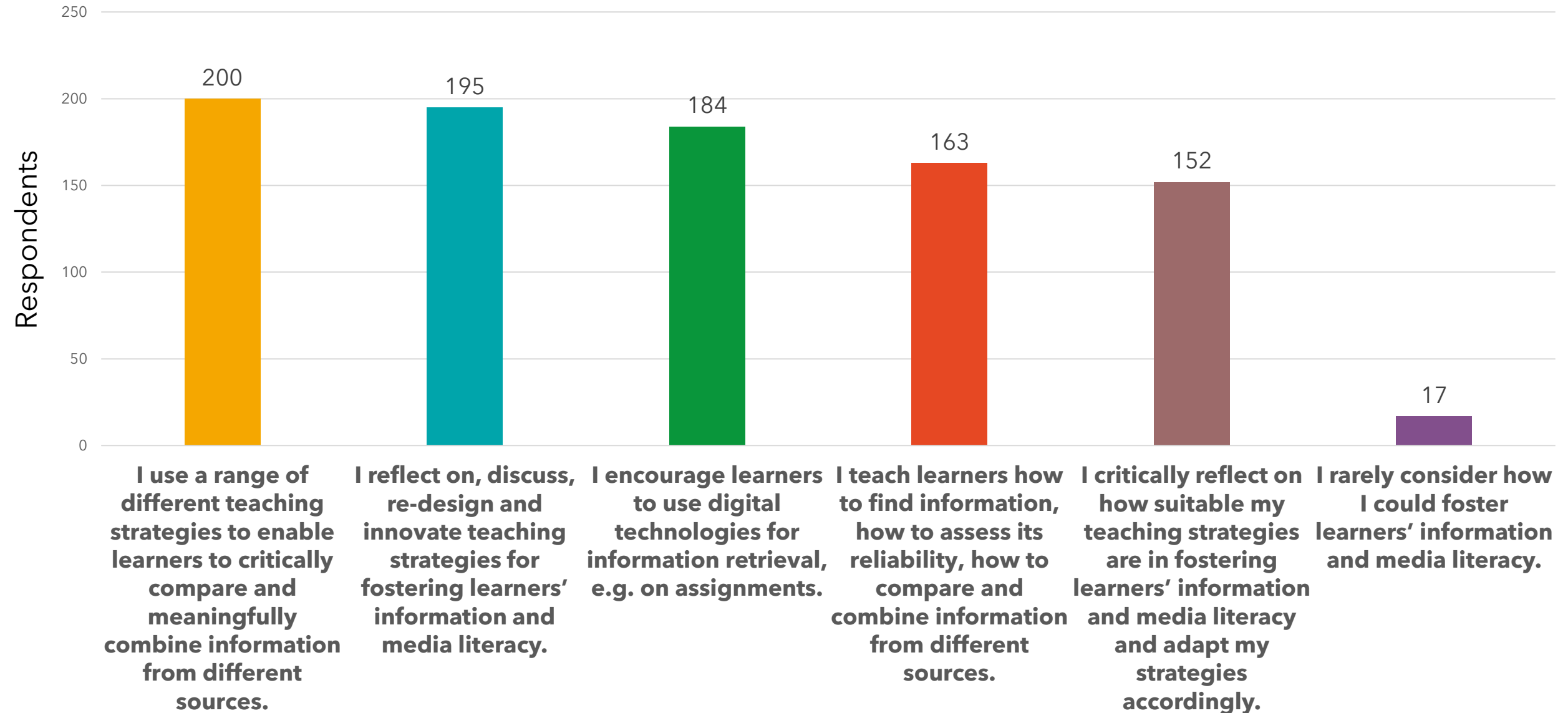


Implementation: STEM Education Master Course for Teachers

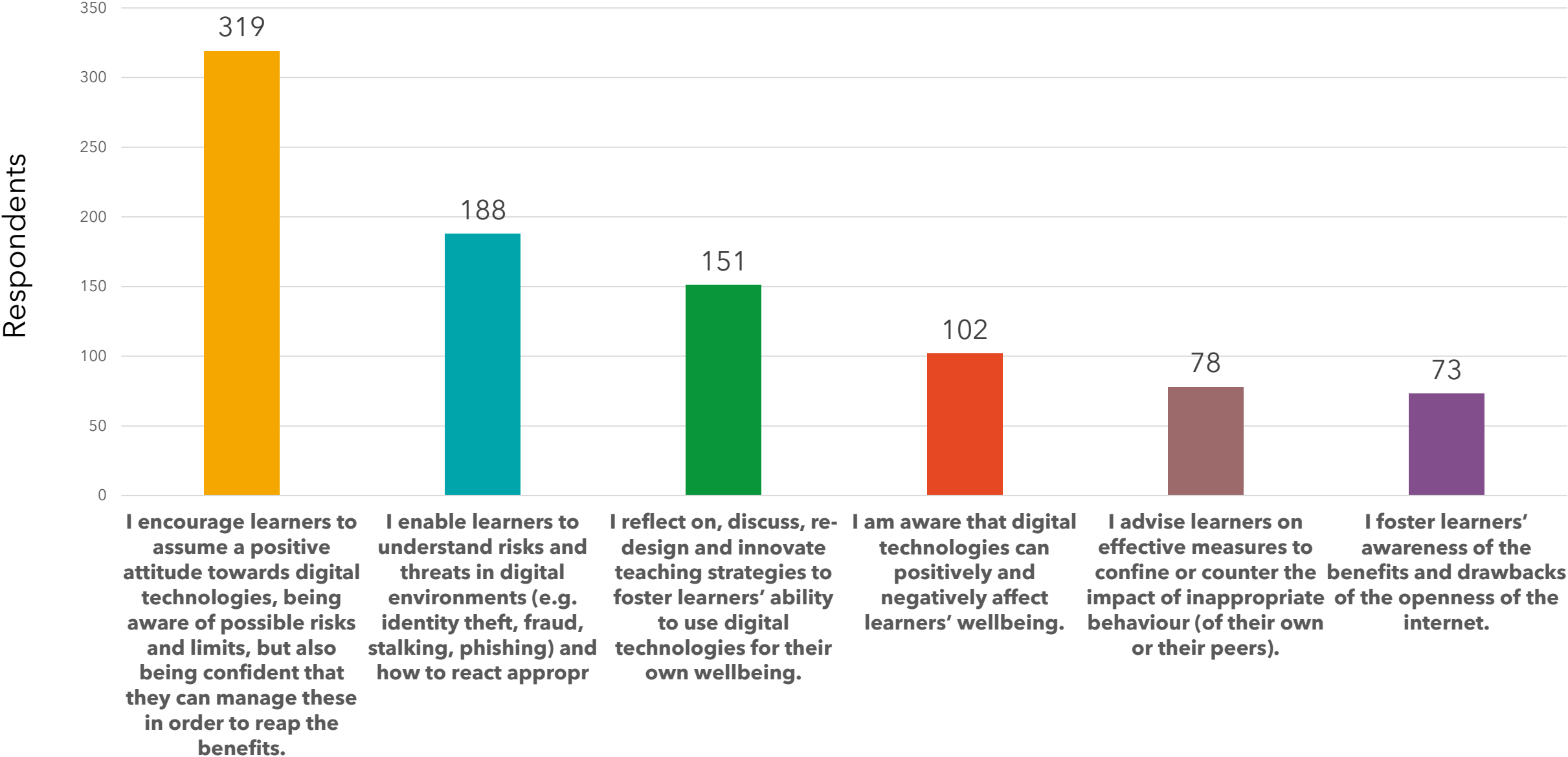
- DICT provided the Learning Management System.
- The online course was offered for 1 month with 2 synchronous sessions with the module developers.
- Parallel pre- and post-course surveys were administered to the participants to assess their digital competence, teaching efficacy, beliefs and attitude toward STEM.

Instruments: Digital Competence Survey based on ITU Framework; Friday Institute for Educational Innovation (2012). Teacher Efficacy and Attitudes Toward STEM Survey-Science Teachers, Raleigh, NC: Author.

Results: Information and Media Literacy of STEM Teachers



Results: Responsible Use of ICT of STEM Teachers



Results: STEM Teacher Efficacy

Item	Mean Rating
I am continuously improving my STEM teaching practice .	4.67
I know the steps necessary to teach STEM effectively .	4.20
I am confident that I can explain to students why STEM experiments work .	4.24
I am confident that I can teach STEM effectively .	4.30
I wonder if I have the necessary skills to teach STEM .*	2.66*
I understand STEM concepts well enough to be effective in teaching STEM .	4.24
I am confident that I can answer students' STEM questions .	4.22
When a student has difficulty understanding a STEM concept, I am confident I know how to help the student understand it better .	4.25
When teaching STEM, I am confident enough to welcome student questions .	4.38
I know what to do to increase student interest in STEM .	4.29
*Reverse Scoring 5 being the highest rating	

Conclusion

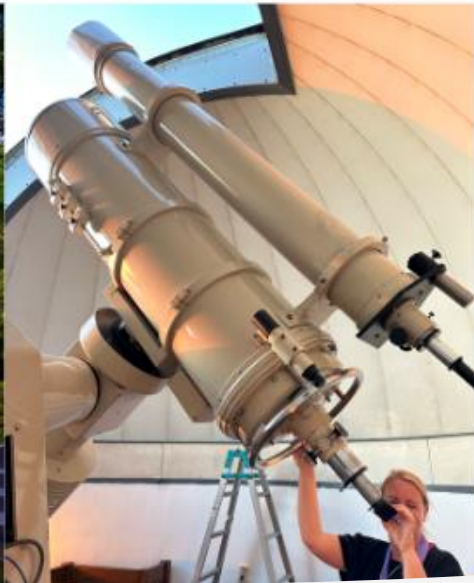
- The STEM Education Master Course was able to develop teachers' information and media literacy that allows them to reflect on, discuss, re-design, innovate, and use a range of teaching strategies for fostering learners' information and media literacy.
- After the course, teachers were more inclined to encourage learners to assume a positive attitude towards digital technologies, being aware of possible risks and limits, but also being confident that they can manage these in order to reap the benefits.
- Teachers indicated high confidence in teaching STEM effectively. They had stronger belief in being able to help students understand STEM better as well as increase their interest in STEM.



Recommendations

- Broaden the reach of the STEM Education master course
- Apply the study in other subject areas
- Explore other teacher outcomes that may be developed through the course

UNIVERSITY OF THE PHILIPPINES - DILIMAN





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