Philippine STEAM Educators Proficiency

STEM education

- propels pursuits to economic growth and progress
- is an important determinant of a nation's future productivity and economic competence and competitiveness
- prepares the future workforce to face the challenges of the 21st century global challenges with disciplinary knowledge imbued with innovativeness, creativity, critical mindedness and ability to collaborate

This study theorizes that the Philippine Higher STEAM educators permeate unique STEAM education proficiency defined by theories influencing the higher education STEAM curricula as mandated by the Philippine government through its Commission on Higher Education (CHED).

Purpose of the Research

The study aimed to determine the Philippine Higher Education STEAM Educators' Proficiency in STEAM Education. Specifically, the study sought answers to the following objectives:

1. Determine the National Proficiency of Philippine Higher Education STEAM educators in terms of the PPST domains and TPACK dimensions.

2. Determine the significant difference of STEAM educators' proficiency in terms of (a) gender, and (2) school type.

Research Design

◆ Descriptive Survey

Instrument

◆ Proficiency Indicators for Philippine STEAM Educators (Morales et al., 2019)

Participants

◆ 1,940 STEAM educators from 220 HEIs in 17 regions

Data Collection

◆ Pre-Survey
◆ Survey
◆ Post-Survey

Scoring and Data Analysis

- descriptive statistics and test of significance to compare the proficiency levels of the STEAM participants in terms of gender and school type

- For comparison purposes, we converted all the domain scores into Standardized Scores (S) ranging from 0 to 100 using the linear transformation equation $S = (SR - LPR) \times (100/HPR)$; where SR, LPR, and HPS represent the Sum of Ratings, Lowest Possible Rating, and Highest Possible Rating.

- Percentile ranking

- T-test

Domain	Beginner	Proficient	Highly Proficient	Distinguished
	f (%)	*f* (%)	*f* (%)	*f* (%)
Domain 1: Content Knowledge, and Pedagogy	146 (7.5)	354 (18.2)	739 (38.1)	701 (36.1)
Domain 2: Learning Environment	56 (2.9)	144 (14.4)	700 (36.1)	1040 (53.6)
Domain 3: Diversity of Learners	62 (3.2)	82 (4.2)	474 (24.4)	1322 (68.1)
Domain 4: Curriculum and Planning	74 (3.8)	191 (9.8)	585 (30.2)	1090 (56.2)
Domain 5: Assessment and Reporting	135 (7.0)	241 (12.4)	728 (37.5)	836 (43.1)
Domain 6: Community Linkages and Professional Engagement	97 (5.0)	120 (6.2)	582 (30.0)	1141 (58.8)
Domain 7: Personal Growth and Professional Development	122 (6.3)	120 (6.2)	780 (40.2)	918 (47.3)
Overall	**60 (3.1)**	**157 (8.1)**	**745 (38.4)**	**978 (50.4)**
TPACK Dimensions	**Beginner**	**Proficient**	**Highly Proficient**	**Distinguished**
TPCK	66 (3.4)	138 (7.1)	582 (30.0)	1154 (59.5)
TPK	56 (2.9)	124 (6.4)	720 (37.1)	1040 (3.6)
TCK	355 (18.3)	416 (21.4)	657 (33.9)	512 (26.4)
PCK	104 (5.4)	208 (10.7)	765 (39.4)	863 (44.5)
TK	184 (9.5)	214 (11.0)	501 (25.8)	1041 (53.7)
PK	33 (1.7)	112 (5.8)	570 (29.4)	1225 (63.1)
CK	83 (4.3)	240 (12.4)	724 (37.3)	893 (46.0)

Domain	M(SD) [Level]	MD	TPACK Dimensions	M(SD) [Level]	MD
Domain 1: Content, Knowledge, and Pedagogy	78.27 (14.26) [HP]	80.26 [HP]	TPCK	85.36 (12.41) [D]	87.50 [D]
Domain 2: Learning Environment	84.99 (13.02) [HP]	87.50 [D]	TPK	84.71 (12.38) [HP]	87.50 [D]
Domain 3: Diversity of Learners	87.83 (12.58) [D]	92.86 [D]	TCK	72.61 (17.75) [HP]	75.00 [HP]
Domain 4: Curriculum and Planning	84.53 (13.00) [HP]	86.11 [D]	PCK	81.63 (13.21) [HP]	84.09 [HP]
Domain 5: Assessment and Reporting	82.01 (16.66) [HP]	83.33 [HP]	TK	81.82 (17.59) [HP]	87.50 [D]
Domain 6: Community Linkages and Professional Engagement	84.44 (13.93) [HP]	85.71 [D]	PK	87.43 (11.46) [D]	90.38 [D]
Domain 7: Personal Growth and Professional Development	83.64 (15.32) [HP]	85.00 [HP]	CK	83.14 (15.59) [HP]	83.33 [HP]
Overall	**83.67 (11.83) [HP]**	**85.36 [D]**			

Table 2
PPST and TPCK proficiency comparison between gender using t-test for independent variables

PPST Domains	Mean (SD)		t	df	p
	Male (n = 936)	Female (n = 1,000)			
Domain 1: Content, Knowledge, and Pedagogy	78.46 (14.56)	78.09 (14.00)	.581	1934	.562
Domain 2: Learning Environment	84.35 (13.57)	85.61 (12.45)	-2.131*[a]	1890.33	.033
Domain 3: Diversity of Learners	86.35 (13.32)	89.21 (11.69)	-5.008***[a]	1862.80	.000
Domain 4: Curriculum and Planning	84.36 (13.71)	84.70 (12.32)	-.573[a]	1878.24	.567
Domain 5: Assessment and Reporting	81.94 (16.93)	82.07 (16.42)	-.173	1934	.863
Domain 6: Community Linkages and Professional Engagement	84.04 (14.34)	84.85 (13.53)	-1.285	1934	.199
Domain 7: Personal Growth and Professional Development	83.41 (16.13)	83.92 (14.51)	-.740[a]	1878.76	.459
Overall Proficiency Indicator	83.27 (12.46)	84.06 (11.20)	-1.469[a]	1878.26	.142
TPCK Dimensions					
TPCK	84.87 (12.95)	85.83 (11.88)	-1.679	1890.651 a	.093
TPK	84.01 (13.00)	85.35 (11.74)	-2.374*	1881.275 a	.018
TCK	73.19 (18.12)	72.06 (17.40)	1.405	1934	.160
PCK	81.37 (13.67)	81.90 (12.77)	-.868	1934	.385
TK	82.45 (17.02)	81.29 (18.09)	1.440	1934	.150
PK	86.32 (12.19)	88.46 (10.65)	-4.088***	1859.45[a]	.000
CK	83.62 (15.64)	82.70 (15.56)	1.294	1934	.196

Note: *=p≤.05, ***=p≤.001, [a]Equal variances not assumed.

	Public (n = 1,219)	Private (n = 635)			
Domain 1: Content, Knowledge, and Pedagogy	78.10 (14.35)	78.53 (13.98)	-.616	1852	.538
Domain 2: Learning Environment	84.65 (13.04)	85.74 (12.82)	-1.719	1852	.086
Domain 3: Diversity of Learners	87.55 (12.76)	88.25 (12.21)	-1.146	1852	.252
Domain 4: Curriculum and Planning	84.38 (13.16)	84.73 (12.72)	-.552	1852	.581
Domain 5: Assessment and Reporting	81.77 (16.34)	82.27 (17.42)	-.606	1852	.545
Domain 6: Community Linkages and Professional Engagement	83.76 (14.44)	85.71 (12.59)	-3.008**[a]	1446.883	.003
Domain 7: Personal Growth and Professional Development	83.29 (15.29)	84.07 (15.35)	-1.048	1852	.295
Overall Proficiency Indicator	83.36 (11.92)	84.19 (11.61)	-1.435	1852	.151
TPCK Dimensions					
TPCK	84.67 (12.70)	86.58 (11.67)	-3.165*	1852	.002
TPK	84.29 (12.57)	85.40 (11.90)	-1.825	1852	.068
TCK	72.62 (17.49)	72.30 (18.09)	.377	1852	.706
PCK	81.54 (13.28)	81.68 (13.19)	-.213	1852	.831
TK	81.29 (17.55)	82.89 (17.59)	-1.870	1852	.062
PK	87.25 (11.72)	87.80 (10.88)	-.990	1852	.322
CK	83.19 (15.84)	83.39 (14.73)	-.259	1852	.796

Note: *** $=p \leq .01$, [a]Equal variances not assumed.

Conclusions

Filipino STEAM educators perceive themselves as "Highly Proficient to distinguished" in terms PPST and TPACK framework exuding a high level of self-confidence in STEAM education and a positive self-concept of "Me as a STEAM Teacher."

Gender and school affiliation of STEAM educators do not influence their positive self-concept, although specific domains and dimensions (e.g., diversity of learners, learning environment, and TPCK) show female-ascendancy and private school affiliation-hegemony.

Recommendations

The study only focused on PPST and TPACK paradigm in framing the general proficiency level of Philippine Higher Education STEAM educators through online survey with low (a little over half of the intended sample) retrieval rate. Better online survey systems may do the job of increasing retrieval rate for better population representation.

Additional or other frameworks may also influence the assessment of proficiency to ensure a complete package of quality STEAM educator for the country.

Thank you!