

Health and skill-related physical fitness tests: An assessment in determining the students' physical fitness level

Pruebas de aptitud física relacionadas con la salud y las habilidades: una evaluación para determinar el nivel de aptitud física de los estudiantes

Louie P. Gula

Visayas State University (Philippines)

Abstract. The primary objective of this study is to comprehensively evaluate and implement health and skill-related physical fitness tests as pre-assessment tools for assessing students' physical fitness levels within educational settings. This study employed a descriptive evaluation technique in identifying the research problems. There are eight colleges in the Visayas State University, the sampling was open to all the students who wanted to participate in the study, and 273 respondents were obtained. To set a standard, persons with disability, immune-compromised, and having a history of cardiovascular diseases were exempted from participating in the fitness tests since they have a different way of catching up on their health status. The study's findings contribute to understanding the relationships between body composition and diverse facets of physical fitness. The insights gained from the physical fitness tests serve as crucial benchmarks for designing effective and personalized physical activity programs. The negative correlation between BMI, muscular endurance and balance implies that individuals with higher BMI may benefit from targeted exercises to improve these areas. Conversely, the positive correlation with agility suggests that agility-focused activities help those with higher BMI. The findings underscore the imperative targeted interventions to enhance overall fitness and well-being, emphasizing the importance of addressing specific strengths and weaknesses through nuanced fitness programs tailored to individual profiles.

Keywords: health, skill, physical fitness, assessment, fitness level

Resumen. El objetivo principal de este estudio es evaluar e implementar de manera integral pruebas de aptitud física relacionadas con la salud y las habilidades como herramientas de evaluación previa para evaluar los niveles de aptitud física de los estudiantes en entornos educativos. Este estudio empleó una técnica de evaluación descriptiva para identificar los problemas de investigación. Hay ocho facultades en la Universidad Estatal de Visayas, el muestreo estuvo abierto a todos los estudiantes que quisieran participar en el estudio y se obtuvieron 273 encuestados. Para establecer un estándar, las personas con discapacidad, inmunocomprometidos y con antecedentes de enfermedades cardiovasculares quedaron exentas de participar en las pruebas de aptitud física, ya que tienen una forma diferente de ponerse al día con su estado de salud. Los hallazgos del estudio contribuyen a comprender las relaciones entre la composición corporal y diversas facetas de la aptitud física. Los conocimientos obtenidos de las pruebas de aptitud física sirven como puntos de referencia cruciales para diseñar programas de actividad física eficaces y personalizados. La correlación negativa entre el IMC, la resistencia muscular y el equilibrio implica que las personas con un IMC más alto pueden beneficiarse de ejercicios específicos para mejorar estas áreas. Por el contrario, la correlación positiva con la agilidad sugiere que las actividades centradas en la agilidad ayudan a quienes tienen un IMC más alto. Los hallazgos subrayan la necesidad de intervenciones específicas imprescindibles para mejorar el estado físico y el bienestar general, enfatizando la importancia de abordar fortalezas y debilidades específicas a través de programas de acondicionamiento físico matizados y adaptados a perfiles individuales.

Palabras clave: salud, habilidad, condición física, evaluación, nivel de condición física

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Louie P. Gula

louie.gula@vsu.edu.ph

Introduction

Active play refers to activities that require using the entire body and lead to burning energy compared when at rest (Mattioni et al., 2021). Frequently participating in active play activities like running, jumping, throwing, catching, and hopping supports the development of physical, social, and cognitive skills (Moore & Lynch, 2018). Active play also boosts physical activity levels and enhances students' fitness (Janssen, 2014). The ability to perform motor skills effectively and physical fitness are both aspects of active play. Physical fitness is identified into two main components: i) things related to your health and ii) your ability to move. Health-related physical fitness involves aspects of fitness that are closely tied to good health. This includes how your body is made up, how well the heart and lungs work, how flexible, and how strong the muscles are (Utesch et al., 2018). Solid evidence shows that students engaging in more physical activity is linked to better health in various ways.

This includes having stronger heart and lung health, better muscle fitness, and a healthier weight (Chaput et al., 2020). Motor skill-related physical fitness includes elements of physical fitness and skills that help you do well in sports and in active games. This involves how quickly you can change direction, how steady you are, how smoothly you move, how strong and explosive your movements are, how fast you can go, and how quickly you can react (Stockwell et al., 2021). Proficiency in motor skills plays a crucial role in a student's ability to engage in active play. Insufficient motor skill competence can significantly restrict a child's capacity to participate in regular daily activities and sports (De Meester et al., 2020). Moreover, it reduces children's interest and involvement in physical activities, and this can lead to health consequences (Prochnow et al., 2020). Furthermore, not engaging in physical activity can hinder a child's chances to learn motor skills and perform at their best. It also raises the likelihood of children with poor motor skills developing overweight and obesity (Muntaner-

Mas et al., 2017). Since more physical activity is linked to better health in students with and without motor problems, it is essential to identify students with lower motor skill-related fitness early (Doe-Asinyo & Smits-Engelsman, 2021). When young children play outside or engage in sporty games, they typically have brief bursts of intense physical activity followed by less activity or lighter periods (Faigenbaum et al., 2020).

In healthcare, the ultimate aim is to promote the well-being of individuals who maintain excellent physical fitness. This state of fitness relies on cardiovascular and respiratory endurance, muscular strength, muscular endurance, body composition, and flexibility (Izquierdo-Alventosa et al., 2020). Most research on the impact of physical activity in preventing diseases has shown that enhancing physical fitness, particularly cardiovascular endurance, is often linked to better overall health or a reduced risk of illness. While a high level of physical fitness generally goes hand in hand with good health, it is essential to note that simply improving one's fitness does not guarantee immunity from diseases or their effects (Shi et al., 2022). Engaging in physical activity can enhance your physical fitness, or one of its components, and improve your clinical health status. However, the health improvement might be attributed to biological changes distinct from the ones responsible for boosting physical fitness. For instance, endurance training can boost aerobic capacity and potentially lower the risk of coronary heart disease. However, the biological changes driving these two benefits may not be the same: the increase in aerobic capacity is likely a result of improved oxygen transport and utilization, while the reduced risk of coronary heart disease may be due to changes in lipoprotein metabolism or fibrinolytic mechanisms, such as blood-clotting (Rethlefsen et al., 2021).

The objective of this study is to comprehensively evaluate and implement health and skill-related physical fitness tests as pre-assessment tools for assessing students' physical fitness levels within educational settings. Additionally, it seeks to investigate any disparities in fitness levels among different student demographics and engagement in fitness programs and explore the potential long-term effects on their health behaviors. Through rigorous quantitative analysis, this research aims to provide evidence-based insights that can inform educational policies, curriculum development, and fitness interventions, ultimately promoting healthier lifestyles and improved overall student well-being.

Materials and methods

Study respondents

The respondents of this study were exclusive only to the college students of the Visayas State University, specifically to the enrolled freshmen. An estimated 3000 students enrolled on the main campus, and the random sampling was

done through PE classes. There are eight colleges in the Visayas State University, and only 34-35 students included as a sample for the total population. The sampling was open to all the students who wanted to participate in the study, and 273 respondents were obtained. To set a standard, persons with disability, immune-compromised, and having a history of cardiovascular issues were exempted from participating in the fitness tests since they have a different way of catching up on their health status.

Table 1.
Sampling

Colleges	Female	Male	Frequency
College of Agriculture and Food Science	18	17	35
College of Education	18	16	34
College of Engineering and Technology	18	16	34
College of Forestry and Environmental Science	18	16	34
College of Management and Economics	18	16	34
College of Nursing	18	16	34
College of Veterinary Medicine	17	17	34
College of Arts and Sciences	17	17	34
Total	142	131	273

Table 2.
Body Mass Index (BMI) by Sex

Body Mass Index	Female		Male		Total	
	Freq	%	Freq	%	Freq	%
Healthy Weight	72	50.7	76	58.5	148	54.4
Obese	7	4.9	10	7.7	17	6.3
Overweight	25	17.6	18	13.8	43	15.8
Underweight	38	26.8	26	20.0	64	23.5
Total	142	100.0	130	100.0	273	100.0

Table 2 shows that most female (50.7%) and male (58.5%) students have a healthy weight. However, many students also fell in the category of underweight, both females (26.8%) and males (20%). Correspondingly, the lowest number of students fell under the obese category, with 6.3% for both sexes.

Table 3.
Height and Weight of the Respondents

	N	Mean	Std. Deviation	Std. Error Mean
Height in meters	273	1.60810	.099957	.006061
Weight in kilograms	273	56.5727	14.97839	.90653

The data shows that the average height of 273 respondents is approximately 1.61 meters, with a standard deviation of about 10 centimeters, indicating a relatively consistent height distribution. The average weight is around 56.57 kilograms, with a larger standard deviation of nearly 15 kilograms, suggesting greater variability in weight among respondents. The standard error values for both height (0.006061 meters) and weight (0.90653 kilograms) indicate that the sample means are reliable estimates of the population means.

Research Procedure

The research procedure outlined encompasses a comprehensive assessment of both health-related and skill-related fitness parameters over a 22-week period. The structured approach involves conducting specific tests on desig-

nated days, alternating between male and female respondents. The pre-assessments cover health-related and skill-related tests. This systematic arrangement allows for a detailed examination of various facets of fitness and potential gender-based differences in performance.

Research Instrument

This study used the standardized instrument tool in physical education on the components of Health and Skill-related physical fitness tests. This assessment has already been widely used as public-domain material by various physical educators and trainers across the globe. A review was carried out on the existing Physical Fitness Tests (PFT) introduced by Dr. Aparicio H. Mequi, former Chair of the Philippine Sports Commission (PSC) and Director of the Bureau of Physical Education and School Sports (BPES). This review aimed to establish updated and more suitable testing protocols for the Special Program in Sports (SPS) and the new K to 12 programs.

Statistical analysis

In analyzing the data, descriptive analysis such as means, frequency, and percentages was used to analyze quantitative data. Furthermore, the Spearman-Rho correlation was also used to measure the strength and direction of association between health and skill-related test results. The primary statistical tool that was used for this study is IBM SPSS version 29.

Research Code of Ethics

In dealing with a human-subject study, the author addressing human subjects research ensured that the study stated in the conduct, as well as the publication, conforms with all local rules. Prior to submitting for publication, author describing human subjects research obtained an assessment and approval from the Institutional Review Board (IRB) of the university. Author of multisite research papers obtained an authorization from the IRB of the institution.

Results

Health-related fitness test

I. Female Category:

Table 4.

Overall Female Respondents' Health-related Fitness Test

Health-related Fitness Test	Interpretation	Implication
Cardiovascular Endurance	Very Poor	Negative (-)
Muscular Strength	Needs Improvement	Negative (-)
Muscular Endurance	Below Average	Negative (-)

Note: Excellent, Very Good, Good, Above Average = Positive (+); Fair, Average = Neutral (+, -); Very Poor, Poor, Below Average, Needs Improvement = Negative (-).

Cardiovascular Endurance presented was measured through obtaining the beats per minute before and after the physical activity. The result displays information that the majority of the female respondents before (23.24%) and af-

ter (70.42%) the activity has very poor cardiovascular endurance with a mean average of around 151 beats per minute. Muscular Strength of female respondents measured through the number of successfully performed push-ups displays that the majority (35.92%) of the female respondents, with a mean average of around eight push-ups, recorded as to needs improvement. Muscular endurance of female respondents measured through the time they endured performing planks shows that most (44.37) female respondents' muscular endurance fell under the level of below average.

To take everything into account, table 4 shows the summary of all health-related fitness tests conducted implies negative results, which entails an intervention to improve the physical fitness.

Skill-related fitness test

Table 5.

Overall Female Respondents' Skill-Related Fitness Test

Skill-related Fitness Test	Interpretation	Implication
Balance	Mean	Neutral (either +, -)
Agility	Average	Neutral (either +, -)
Speed	Poor; Above Average	Negative (-); Positive (+)

Note: Excellent, Good, Above Average = Positive (+); Mean, Average = Neutral (either +, -), Regular, Poor, Below Average = Negative (-).

Balance score of female respondents reveals that more than 50% of the respondents performed below 30 seconds, which means a fair condition, implying neither good nor bad. Agility score of female respondents measured through Illinois agility run test shows that most (59.86%) of the female respondents' agility were average (18.0 - 21.7 seconds). Speed score of female respondents measured through performing a 30-meter sprint reveals that the majority with the same number of female respondents (20.42%) fell under the category of poor (>5.0) and above average (4.5 - 4.6).

To put it all together, table 5 summarizes all conducted skill-related fitness tests shows that female respondents performed most of the skill-related tests in a neutral condition, implying either a positive or negative indicator. Parallel to this, the speed also obtained negative and positive implications. Therefore, the researcher has noticed that in terms of skill-related fitness tests, it is recommended to have an intervention for better performance in physical activities.

Health-related fitness test

II. Male Category:

Table 6.

Overall Male Respondents' Health-related Fitness Test

Health-related Fitness Test	Interpretation	Implication
Cardiovascular Endurance	Above Average (Before the Activity); Very Poor (After the Activity)	Positive (+); Negative (-)
Muscular Strength	Needs Improvement	Negative (-)
Muscular Endurance	Average	Neutral (+, -)

Note: Excellent, Very Good, Good, Above Average = Positive (+); Average, Fair = Neutral (+, -); Very Poor, Poor, Below Average, Fair, Needs Improvement = Negative.

Cardiovascular Endurance presented reflects the endurance of male respondents measured through obtaining the beats per minute before and after the physical activity. The result shows that most male respondents obtained an above-average (90 – 99 beats per minute) cardiovascular endurance before the activity. However, after performing the physical activity, most male respondents observed to have a very poor cardiovascular endurance (>128). Muscular Strength of male respondents measured through the number of successfully performed push-ups displays that the majority (36.15%) of the male respondents' muscular strength is still in need of improvement (≤ 16). Muscular Endurance of male respondents measured through the time they endured performing planks shows that most (43.85%) male respondents have an average (1-2 minutes) muscular endurance.

To consider everything, table 6 shows the summary of all health-related fitness tests conducted where the majority of the tests resulted in unfavorable results. Hence, it is recommended to implement an intervention or to further the scope of the standardized test to evaluate and track students' progress.

Skill-related fitness test

Table 7.

Overall Male Respondents' Skill-Related Fitness Test

Skill-related Fitness Test	Interpretation	Implication
Balance	Mean	Neutral (either +, -)
Agility	Average	Neutral (either +, -)
Speed	Below Average	Negative (-)

Note: Excellent, Good, Above Average = Positive (+); Mean, Average = Neutral (either +, -), Regular, Poor, Below Average = Negative (-).

In the table 7, Balance score of male respondents reveals that more than 50% of the respondents performed below 30 seconds, meaning a fair condition implies neither good nor bad. Agility score of male respondents measured through the time performing the Illinois agility run test

shows that most (73.08%) of the male respondents' agility fell in the average category (16.2 – 18.1 seconds). Speed of male respondents was measured the time they spent performing a 30-meter sprint reveals that the majority (18.46%) of the male respondents' speed fell below average category (4.5 – 4.6 seconds).

To put it all together, table 7 summarizes all conducted skill-related fitness tests shows that male respondents performed most skill-related tests in a neutral condition, implying either a positive or negative indicator. However, speed, as the tie-breaker, implies a negative result. Thus, overall, male respondents' skill-related fitness test results will be categorized as unfavorable. Therefore, intervention is highly recommended for improvements.

The Relationship Between Health and Skill-related Fitness Tests

Table 8.

Spearman Correlation of Health-related and Skill-related Fitness Tests

	Health-related Fitness Test	Skill-related Fitness Test
Health-related Fitness Test		
Coefficient	1.000	.261**
P-value	-	.000
Skill-related Fitness Test		
Coefficient	.261**	1.000
P-value	.000	-

Note: **Significant at $\alpha = 0.01$

Table 8 reveals that health and skill-related fitness tests obtained a coefficient of .261 and a p-value of (.000<0.01). It infers that health and skill-related fitness tests have statistically significant associations and denote a positive relationship. It implies that as the health-related fitness test result increases, the skill-related fitness test also increases.

The data obtained in this study were ordinal and categorical data. Thus, a nonparametric test was used, specifically Spearman's rho correlation.

The Spearman Correlation of Demographic Profile and Fitness Tests

Table 9.

Spearman Correlation of Body Mass Index, Health, and Skill-related Fitness Tests

	BMI	CAE-Bef	CAE-Aft	MS	ME	Agil	Bal	Speed
BMI								
Coefficient	1.000	.008	.115	-.023	-.222**	.399**	-.126*	.113
P-value	-	.892	.058	.713	.000	.000	.038	.065
CAE-Bef								
Coefficient	.008	1.000	.404**	.020	-.004	.026	.083	.111
P-value	.892	-	.000	.748	.952	.675	.172	.070
CAE-Aft								
Coefficient	.115	.404**	1.000	-.076	-.072	.177**	.020	.063
P-value	.058	.000	-	.211	.235	.003	.741	.306
MS								
Coefficient	-.023	.020	-.076	1.000	.366**	.209**	.153*	.020
P-value	.713	.748	.211	-	.000	.001	.012	.752
ME								
Coefficient	-.222**	-.004	-.072	.366**	1.000	.081	.192**	.049
P-value	.000	.952	.235	.000	-	.182	.001	.426
Agil								
Coefficient	.399**	.026	.177**	.209**	.081	1.000	-.075	.180**
P-value	.000	.675	.003	.001	.182	-	.217	.003
Bal								
Coefficient	-.126*	.083	.020	.153*	.192**	-.075	1.000	.097

P-value	.038	.172	.741	.012	.001	.217	-	.112
Speed								
Coefficient	.113	.111	.063	.020	.049	.180**	.097	1.000
P-value	.065	.070	.306	.752	.426	.003	.112	-

Note: BMI (Body Mass Index); CAE-Bef (Cardio-vascular endurance before jog); CAE-Aft (Cardio-vascular endurance after jog); MS (Muscular strength); ME (Muscular endurance); Bal (Balance); Agil (Agility)

**, *Significant at $\alpha = 0.01, .05$, respectively.

Table 9 reveals that BMI has a significant relationship with muscular endurance with a p-value of ($.000 < 0.05$), agility with a p-value of ($.000 < 0.05$), and balance, with p-value of ($.038 < 0.05$). It also shows that BMI negatively correlates with muscular endurance and balance, which means that a higher student's BMI tends to be associated with lower muscular endurance and balance. On the flip side, BMI is positively associated with agility, which means that a favorable student's BMI tends to be associated with a higher ability to move quickly and easily.

Additionally, cardiovascular endurance before activity has a significant positive association with cardiovascular endurance after activity. It implies that a higher fitness category before the activity tends to be associated with a higher fitness category after the activity (Aguirre et al., 2023). On the flip side, cardio-vascular endurance after activity has a significant positive relationship with student's agility. It infers that the higher the student's fitness category, the higher the ability to move quickly and easily.

Likewise, muscular strength is positively associated with endurance, agility, and balance with p-values of .000, .001, and .012, respectively. It shows that the higher ability to move and lift objects with force and weight tends to be associated with a higher ability to sustain exercise for a long time (muscular endurance), a higher ability to move quickly and easily (agility), and higher ability to maintain a controlled body position during task performance (balance) (Pereira et al., 2024).

Discussion

The study encompasses Health-Related and Skill-Related Fitness components, shedding light on the interconnected nature of these aspects. The demographic profile reveals a slightly higher participation of females, aligning with the general trend in fitness assessments. This distribution is crucial for understanding subsequent fitness insights, as discussed by Galloway (2003) and Petrigna et al. (2022), emphasizing the importance of gender-specific considerations in health promotion initiatives.

The Body Mass Index (BMI) data contributes to understanding respondents' weight status. The majority falling within the healthy weight category resonates with the WHO's emphasis on maintaining a healthy weight for overall well-being (Awada et al., 2021). The notable percentages of underweight and overweight/obese individuals underscore the importance of weight management strategies. This aligns with Dollman et al. (2005) observation of the increasing prevalence of overweight and obese children, emphasizing the need for health promotion programs.

The correlation analyses unravel the intricate relationships between health-related and skill-related fitness components. The positive correlations emphasize the interconnectedness of these aspects, supporting the idea that improvements in health-related fitness may positively influence skill-related fitness, as Bailey et al. (2009) suggested. This holistic perspective aligns with the American College of Sports Medicine's guidelines for overall health enhancement through physical activity.

The correlations involving BMI and various fitness components add depth to understanding body composition's impact on physical fitness. The significant negative correlation between BMI and muscular endurance, and BMI and balance is noteworthy, indicating that higher BMI may be associated with lower muscular endurance and balance capabilities. Conversely, the positive correlation with agility suggests a potential area of strength in individuals with higher BMI. These findings resonate with the literature on the multifaceted associations between BMI and health-related physical fitness (Hulteen, 2018).

The study's findings contribute to understanding the relationships between body composition and diverse facets of physical fitness. The insights gained from the physical fitness tests serve as crucial benchmarks for designing effective and personalized physical activity programs. According to Saputra et al. (2024) it can be inferred that the findings can contribute to understanding the relationships between body composition and physical fitness, and the insights gained from the physical fitness tests can be used as benchmarks for designing effective and personalized physical activity programs.

The negative correlation between BMI and muscular endurance and balance implies that individuals with higher BMI may benefit from targeted exercises to improve these areas. The positive correlation with agility suggests that agility-focused activities may benefit those with higher BMI. This holistic approach aligns with fostering well-rounded motor competence, as proposed by Bailey et al. (2009) and Singh et al. (2019), for cultivating healthy fitness and physical activity behaviors.

A relationship exists between good physical fitness and skill-related abilities. "Skill-related fitness" refers to an individual's ability to execute specific athletic or sports-related abilities successfully. In contrast, "physical fitness" refers to an individual's ability to participate in and complete various physically demanding activities and tasks. These two aspects of physical health are related and may impact one another in several ways. Among the factors influencing athletic performance, physical fitness could be considered the paramount determinant (Kariyawasam et al., 2019).

To begin with, an individual's skill-related skills may be

improved by increasing their level of physical fitness. For instance, an athlete who is physically fit and has solid cardiovascular endurance can perform for more extended periods without being fatigued. This may help the athlete perform better in endurance sports such as running and swimming. While this statement is not directly sourced from the document, it aligns with the general understanding that physical fitness, particularly cardiovascular endurance, plays a crucial role in an athlete's ability to perform well in endurance-based sports. By improving their physical fitness, athletes can enhance their stamina, reduce fatigue, and perform at higher levels for extended periods, ultimately leading to better performance in activities that require endurance, such as running and swimming (Rusillo et al., 2023).

Similarly, athletes who are strong and have excellent muscular endurance will have a more vital ability to undertake explosive motions, such as leaping or running faster. Physical fitness is engaging in daily tasks with energy and alertness, without excessive exhaustion, while enjoying leisure activities and handling unexpected challenges (Singh & Singh, 2017).

A person's overall physical fitness may also be improved by increasing their level of skill-related fitness. For instance, participating in sports like gymnastics or martial arts that involve a high degree of agility, balance, and coordination may enhance an individual's general balance and coordination. This, in turn, can help to avoid injuries and improve overall physical performance. The fusion of health-related and skill-related components of physical fitness is crucial in molding individuals for sports or games (Kariyawasam et al., 2019).

Conclusions

Physical fitness assessment data reveals insights into female and male respondents' health-related and skill-related fitness levels. Covering diverse components, such as cardiovascular endurance, muscular strength, agility, and balance, contributes to a holistic understanding of the respondents' physical fitness. Notably, most respondents fell within the healthy weight category, emphasizing the importance of weight management for overall well-being. The gender-specific analysis pinpointed areas of improvement, with females exhibiting deficiencies in cardiovascular endurance, muscular strength, and speed and males facing declines in cardiovascular endurance post-activity. The correlations, particularly those involving BMI, added depth to the analysis, uncovering associations between body composition and various fitness components. The negative correlation between BMI and muscular endurance/balance suggests areas for targeted improvement, while the positive correlation with agility provides a potential strength to leverage. The interconnected nature of health-related and skill-related fitness, highlighted by positive associations and significant correlations, underscores the need for comprehensive and tailored interventions. This study provides valuable insights

into the complex relationships between different fitness measures and BMI and emphasizes the importance of fitness assessments in guiding effective and personalized physical activity programs. In conclusion, the findings underscore the imperative for targeted interventions to enhance overall fitness and well-being, emphasizing the importance of addressing specific strengths and weaknesses through nuanced fitness programs tailored to individual profiles.

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Conflict of interest

The authors declare that there are no conflicts of interest.

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Datos de los/as autores/as y traductor/a:

Louie P. Gula

louie.gula@vsu.edu.ph

Autor/a – Traductor/a