LEARNING AS ONE NATION

Expanded Project

Stat & Prob_Q3_7

SHS LEARNING ACTIVITY

Name: _____ **Score/Mark:** _____

Grade and Section: _____ **Date:** _____

Strand: ☐ STEM ☐ ABM ☐ HUMSS ☐ ICT (*TVL Track*)

Subject: ***Statistics & Probability***

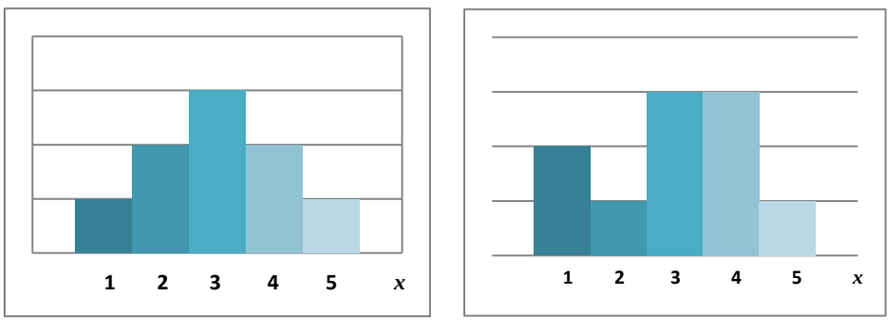
Type of Activity: ☐ Concept Notes ☐ Skills: Exercise/Drill ☐ Illustration ☐ Performance Task ☐ Essay/Report ☐ Others: _____

Activity Title: Variance of a Discrete Random Variable

Learning Target: To define, calculate and interpret the variance of a discrete random variable.

References: *(Author, Title, Pages)*
1) Walpole, R. E. et al. "Probability and Statistics for Engineers & Scientists, 8th Ed", pp. 115-131;
2) L.A. Sajulga, CVIF Learning Activities

Variance – describes how widely spread out are the values of a random variable X around its given mean μ where the probability distribution is centered. Denoted by $Var(X)$ or σ^2, it characterizes the variability or dispersion of the X's observed values from the mean.



(a) smaller variance (b) larger variance

Figure 1: Distributions with equal means μ = 3 but with unequal variances

The variance of a discrete random variable X is given by:

$$\boxed{\sigma^2 = E(X^2) - u^2}$$

Example: Let the random variable X represent the number of uninfected puppies from a population infected with a certain virus. Three (3) samples are obtained and examined. The probability distribution of X is given by:

x	0	1	2	3
$f(x)$	0.51	0.38	0.10	0.01

Solution: First, we need to compute for the mean μ,

$$\mu = (0)(0.51) + (1)(0.38) + (2)(0.10) + (3)(0.01) = \mathbf{0.61}$$

Now, we have to find for $E(X^2)$,

$$E(X^2) = (0)^2(0.51) + (1)^2(0.38) + (2)^2(0.10) + (3)^2(0.01) = \mathbf{0.87}$$

Hence, it follows that

$$\sigma^2 = E(X^2) - u^2 = 0.87 - (0.61)^2 = 0.4979 = \boxed{0.5}\ .$$

Exercise:

1. Using the example from the previous activity ('Mean of a Discrete Random Variable') where the expected value is 1,050.00 Php, calculate the variance.
2. What does dispersion or variability mean?