ON THE SPREAD OF COMPUTER LITERACY AMONG EDUCATION STUDENTS

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-Abstract-

This paper presented an agent-based model on the spread of computer software literacy among Education students of the four external campuses in the provinces of Leyte of the Eastern Visayas State University (EVSU), Tacloban City, Leyte, Philippines. Computer literacy on information communication technology is a major concern in the EVSU family, not just in compliance with the new curriculum in the K-12 program but also in terms of its impact on society and economic development. The model described in this paper focuses on Netlogo as a simulator for agent based modelling. The results presented would be a tool for policy development.

Key words: computer literacy, agent-based model, netlogo
JEL Classification: E27-Forecasting and Simulation

1. INTRODUCTION

1.1 Model Identification

The “Computer Literacy Model” (CLM) centers on the Education students as learners and as an active agent in the computer skills and knowledge acquisition process, while the teachers play as facilitators of computer software literacy (Papert, 1993:45-46).

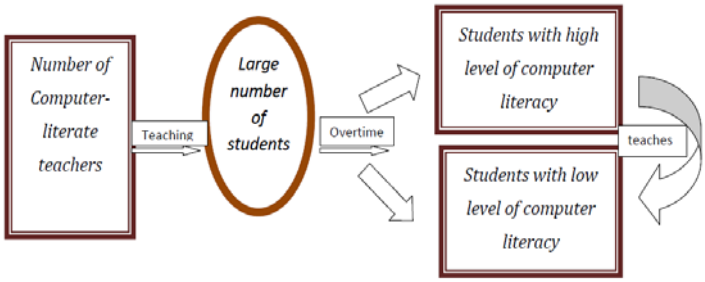
It is anchored on the following assumptions:

- that the initial population taught by a computer literate teacher is 300.
- that not all teachers and students are computer-literate.
- that students have easy access to computer;
- that Education students in the four external campuses of the EVSU, Tacloban City, Philippines do peer-teaching, then again spreading their computer skills through practice teaching, and eventually spread their skills as a full-fledged teacher.

These are based on the premise that a paradigm shift to more interactive learning due to the exploitation of the digital media is taking place in our learning institutions. That is, from linear to hypermedia; from instruction to construction and recovery; from teacher-centered to learner-centered education; from absorbing material to learning how to navigate and how to learn; from school to lifelong learning; from one-size-fits-all to customized learning; from learning as torture as learning as fun; from the teacher as transmitter to the teacher as facilitator (Tapscott, 1998:203-205).

Figure 1 simulates the scenario where there are few available computer-literate teachers teaching a large number of Education students. For those Education students who have high level of computer literacy were assigned to do peer teaching to students with low level of computer- literacy.

Figure-1: Computer Literacy Model



Source: Gibbons, 1998:01-03.

Given this CLM, the following key questions are addressed:

- What is the optimum number of computer-literate teachers needed to produce at least 80% of Education students to become highly computer literate?

- How long will it take to produce 80% highly computer literate Education students with the optimum number of computer-literate teachers?

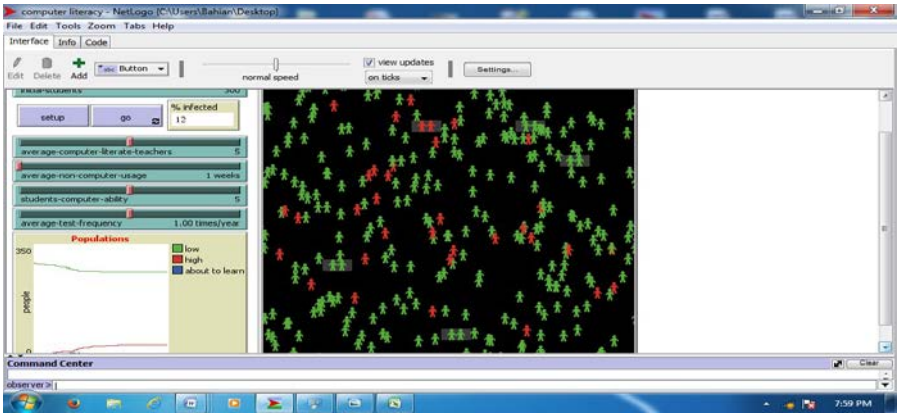
- How many will be highly computer literate Education students for a period of 1 week?

2. PROCESS AND OUTPUT

2.1 Scenarios from the Model

The parameters were utilized and processed using a Netlogo software to surface the macro-behaviors driven the micro-attributes of the agents (Wilensky,2007:4).

Figure 2. Typical output of the system for 5 computer-literate teachers



Legend: Red - High
Blue - Average
Green - Low

Table 1. Simulation results for 5 computer-literate teachers

Levels of Computer Literacy	Trials										
	1	2	3	4	5	6	7	8	9	10	Average
High	24.33	20.00	17.00	23.33	5.00	5.67	7.67	5.67	39.00	12.00	15.97
Average	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Low	76.00	79.67	82.67	75.33	94.00	93.33	91.67	93.33	61.33	87.67	83.50

Table 1 presents the simulation results for 5 computer-literate teachers to spread the computer literacy. There were 300 Education students generated in 10 trials /run. Students with high level of computer literacy is 15.97 % only as indicated by red; average level is 0.67 % as indicated by blue; and low level of computer literacy is 83.5 % as indicated by green.

Table 2. Simulation results for 6 computer-literate teachers

Levels of Computer Literacy	Trials										
	1	2	3	4	5	6	7	8	9	10	Average
High	4.33	32.00	28.33	10.67	15.00	33.33	27.67	20.00	14.33	52.67	23.83
Average	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Low	95.33	68.33	71.00	89.00	84.67	65.33	72.00	79.00	84.00	47.00	75.57

Table 2 shows simulation results for 6 computer literate teachers who influenced students with high level of computer literacy of 23.83 %; for average level, 0.67%; and for low level computer literacy, 75.57%.

Table 3. Simulation results for 7 computer-literate teachers

Levels of Computer Literacy	Trials										
	1	2	3	4	5	6	7	8	9	10	Average
High	54.67	61.33	67.67	69.67	61.30	70.33	71.00	66.00	32.00	62.67	61.66
Average	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Low	44.00	37.00	32.00	30.00	38.30	28.33	28.33	33.33	68.33	35.67	37.53

Table 3 depicts the 7 computer literate teacher simulation run. Students with high level of computer literacy is 61.67 %;average level, 0.67 %;and low level, 37.53 %.

Levels of Computer Literacy	Trials										
	1	2	3	4	5	6	7	8	9	10	Average
High	76.67	64.67	73.33	69.00	79.00	86.67	82.67	74.67	84.00	81.67	77.24
Average	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67	0.67
Low	22.00	32.67	25.67	30.00	19.33	12.67	17.67	24.33	16.33	17.00	21.77

Table 4 displays the 8 computer literate teachers who influenced Education students with high level of computer literacy of 232 or 77.24% , and 21.77 % for low level.

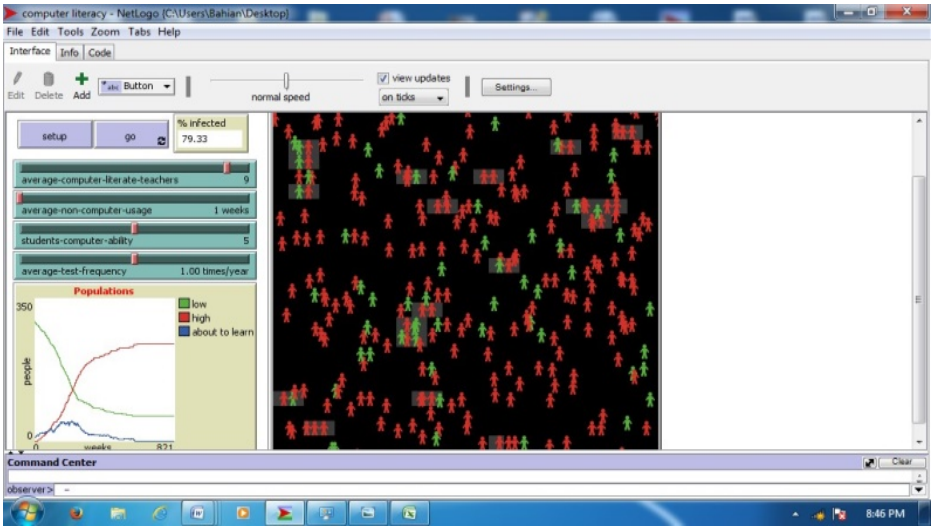


Figure-3: Typical Output of 9 Optimum Number of Computer Literate Teachers

Legend: Red - High
Blue – Average
Green – Low

Table 5: Simulation Results for 9 Computer-Literate Teachers

Levels of Computer Literacy	Trials										
	1	2	3	4	5	6	7	8	9	10	Average
High	78.33	78.33	78.33	86.67	81.00	79.67	72.67	87.67	77.67	84.67	80.50
Average	1.33	1.33	0.67	1.33	0.67	0.67	0.67	1.33	1.33	1.33	1.07
Low	17.67	20.00	20.00	12.00	16.33	15.67	20.67	10.67	20.00	15.00	16.80

Table 5 reveals that 9 is the optimum number of computer literate teachers that enable to influence 242 or 80.50% Education students to become highly computer literate; average, 10.66% and low level, 50 or 16.80%.

2.2 Sensitivity analysis

Sensitivity analysis was used to evaluate the sensitivity of computer literacy of Education students to changes in other parameters, including average non-computer use, students' computer ability and average test frequency.

The sensitivity analysis results demonstrate that computer literacy was highly sensitive to non-computer use, and slightly sensitive to students' computer ability and average test frequency. An increase in non-computer use resulted in a decrease in computer literacy and a slight decrease in students' ability and average test frequency.

Table 6: Sensitivity Tests

Non-computer use	50.00	100.00	150.00	200.00
Percent Influence	77.33	16.67	7.33	4.00
Student's Computer Ability	1.00	2.00	3.00	4.00
Percent Influence	82.67	80.00	80.00	70.67
Average Test Frequency	1.00	2.00	3.00	4.00
Percent Influence	82.00	76.00	79.67	75.67

3. CONCLUSION

Computer software literacy of the four external campuses in the province of Leyte of the EVSU, Tacloban City, Philippines is widely spread by increasing the number of computer literate teachers and peer teaching of highly computer literate Education students to low computer literate Education students, and is minimized by increasing non-computer use.

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