

Student Performance at College Level Introductory Computer Courses – Does Gender and Maturity Play a Role?

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Objective

Investigate the hypothesis that the gender and maturity of the student plays a role in performance at college level computer courses.

Outline:

Most of the entering business students at our university enroll in a computer literacy course called “Computers Literacy”. In this course students will learn effective strategies for learning and applying microcomputer software including word processing, spreadsheet, presentation and database management. The course introduces concepts, terminology, and tools of the microcomputer software operating and application system environment. Introduction to the effective utilization of networking for communication, research, and information downloading is also incorporated in the course. Emphasis is on preparing the student to use computer technology effectively in education and work environments.

The second computer class is called “Software Tools for Business”. This course prepares students to be proficient in problem solving through the application of spreadsheet and database tools. In addition, students are introduced to other decision support tools, such as electronic presentation tools and web editors that are used in today's global workforce.

Our study will investigate the knowledge of the students at the beginning of the course by administering a pretest. Their knowledge at the end of the semester will also be evaluated by means of a posttest. The pretest and posttest scores will be compared to ascertain whether the students have increased their knowledge base and skill set.

Statistical analysis will be done to ascertain whether (1) gender plays a role in the students' understanding of the computer concepts and (2) the students' maturity level (determined by their class standing – freshmen, sophomore, junior or senior – plays a role in the students' understanding of computer concepts.

BACKGROUND

This research was conducted in a university set in a rural community. The university delivers a strong and affordable education for friendly, ambitious students who thrive in a student-focused learning environment defined by small class sizes and faculty committed to teaching and student success.

Academically, the University offers 143 undergraduate degree programs, including 12 associate level degrees and 131 baccalaureate degrees in four colleges — Caudill College of Arts, Humanities and Social Sciences; College of Business and Public Affairs; College of Education; and College of Science and Technology — and 20 academic departments.

There are 70 graduate degree programs plus one education specialist program in five specialty areas also is offered. A master's degree for physician assistants, social workers and a cooperative doctoral program, all in collaboration with the flagship university in the state, are available on the our campus. A doctoral degree in education began in fall 2010.

Classes are offered at regional campuses. Additionally, the University offers a number of distance learning courses throughout the region via the Internet and interactive compressed video.

Physically, the University is located in the foothills of the Daniel Boone National Forest in Rowan County. The instructional plant includes 120 classrooms and 112 laboratories. Housing facilities include space for approximately 2,600 students in a variety of housing styles, including traditional residence halls, suites and apartments.

Fiscally, the University currently operates on an annual budget of \$129.2 million with about \$41.7 million provided by the state and \$52.7 million coming from tuition and fees. Additionally, grants and contracts from external sources for research, service and academic/student support projects generate more than \$15 million each year. Annual private gifts to the University, average \$3 million annually.

Statistically, the University has awarded more than 55,000 degrees and currently has more than 1,100 full-time employees. Enrollment for fall 2010 was more than 9,000, with the student body representing 106 counties in the state, 42 states and 35 foreign countries. The University attracts more than 50,000 visitors annually and its economic impact, directly and indirectly, on the area is estimated at more than \$90 million yearly.

METHODOLOGY

A pretest comprising 50 questions and covering topics such as

- Computer concepts
- Word processing
- Spreadsheet analysis
- Database management
- Presentation graphics
- Internet and world wide web

was administered to the students within the first two weeks of class during a semester. Their scores were recorded. The same test was administered at the end of the semester and the scores recorded. The pretest and posttest scores were compared and analyzed using statistical techniques to ascertain the answers to the following questions:

1. Have the students gained additional knowledge from the class?
2. Is the difference in their pretest and posttest scores statistically significant?
3. Should our university continue offering this course in the future?

The study

The composition of the exam is highlighted in Table 1.

FIRST COURSE

Table 1 – Tasks within each topic

Topic	Tasks
Windows Concepts (5 questions)	<ul style="list-style-type: none"> • Switch users • Start Windows 7 help • Create a folder in Explorer • Rename a file • Open an Office document using Start search
MS Word 2010 (10 questions)	<ul style="list-style-type: none"> • Create a new blank document • Save a document • Copy and paste text • Change the font • Bold text • Adjust the line spacing • Create a document header • Change the footer for odd and even pages • Create a footnote • Check spelling
MS Excel 2010 (11 questions)	<ul style="list-style-type: none"> • Rename a worksheet • Use absolute cell references • Select non-adjacent cells • Align cell contents • Apply conditional formatting to a range of cells • Insert a cell • Autofill a numeric series • Modify worksheet orientation • Create a formula using SUM function • Print formulas • Create a combination chart
MS Access 2010 (9 questions)	<ul style="list-style-type: none"> • Save a table • Create a table in Design view • Set the primary key for a table • Use the Input Mask Wizard • Create a query in Design view • Use text criteria in a query • Create and run an Update query • Use a form to add a record • Create a report using the Report Wizard

Topic	Tasks
MS Powerpoint 2010 (7 questions)	<ul style="list-style-type: none"> • Create a new presentation from a template • Print handouts • Insert a picture • Add a footer to all slides except the title slide • Insert an audio file • Animate a chart • Switch to Slide Master view
Internet Explorer 9 (3 questions)	<ul style="list-style-type: none"> • Go to a web page • View the browser history • Turn off pop-up blocker
MS Expression Web (2 questions)	<ul style="list-style-type: none"> • Define a "web site" • Name popular browsers
Computer Concepts (3 questions)	<ul style="list-style-type: none"> • Define "Hard copy" • Define "hardware" • Define "RAM"

SECOND COURSE**Table 2 – Tasks within each topic**

Topic	Tasks
Windows Concepts (4 questions)	<ul style="list-style-type: none"> • Move a file • Create a folder in Explorer • Rename a file • Open an Office document using Start search
MS Excel 2010 (14 questions)	<ul style="list-style-type: none"> • Create a formula using the SUM function • Modify column width • Rename a worksheet • Print formulas • Select non-adjacent cells • Use absolute cell references • Insert a cell • Apply conditional formatting to a range of cells • Print a worksheet • Align cell contents • Autofill a numeric series • Create a combination chart • Enter numbers in a cell • Modify worksheet orientation
MS Access 2010 (8 questions)	<ul style="list-style-type: none"> • Save a table • Create a table in Design view • Set the primary key for a table • Create a query in Design view • Use text criteria in a query • Create a report using the Report Wizard • Create and run an Update query • Use a form to add a record
MS Powerpoint 2010 (9 questions)	<ul style="list-style-type: none"> • Create a new presentation from a template • Print handouts • Run a slide show • Manually adjust slide show timings • Insert a picture • Add a footer to all slides except the title slide • Insert an audio file • Animate a chart • Switch to Slide Master view

The study was conducted in several sections of the “Introduction to Computers” class. The sample size was 105. The sample consisted of 66 females and 39 males. The pretest average was 58.12%. The posttest average was 74.50%. There was a definite improvement in the grade between pretest and posttest. Table 2 below summarizes the results. The median has improved by 20 percentage points, indicating that the entire class performed better after the course, as compared to the beginning of the course.

Table 3: Comparison of the pre/post test results

	Pretest	Posttest
Minimum	33%	51%
Median	58%	78%
Average	58.12%	74.50%
Maximum	80%	92%

Tests were conducted to ascertain if the results were statistically significant. The technique that allows practitioners to compare two or more populations of interval data is called the *analysis of variance* and it is an extremely powerful and commonly used procedure. The analysis of variance technique determines whether differences exist between population means.

The null hypothesis will state that there are no differences between the pretest and posttest means. Hence,

$$H_0 : \mu_{\text{pretest}} = \mu_{\text{posttest}}$$

The analysis of variance determines whether there is enough statistical evidence to show that the null hypothesis is false. Consequently, the alternative hypothesis will specify the following:

$$H_1 : \mu_{\text{pretest}} \text{ is not equal to } \mu_{\text{posttest}}$$

The next step is to determine the test statistic. The ANOVA test was done using MS Excel 2010. The results are reproduced below.

Anova: Single Factor SUMMARY						
Groups	Count	Sum	Average	Variance		
PRE	105.000	61.030	0.581	0.010		
POST	105.000	78.220	0.745	0.009		
ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1.407	1.000	1.407	150.266	0.000	3.887
Within Groups	1.948	208.000	0.009			
Total	3.355	209.000				

The F-Value of 150.266 (significance level of 0.000) indicates that the differences between the pretest means and posttest means was greater than that which could be expected by chance. Thus, there was a significant gain in student knowledge because of taking the course. Consequently, students who took the class were able to improve their understanding, learning and using the concepts that they learnt by enrolling in the class.

CONCLUSION

“Entering freshmen nowadays do not need an introductory computer class since they have learnt all the necessary computer skills at the high school level” is a very prevalent theory among many academics especially in our university. This research tested this theory and statistically proved that this theory is wrong. Students do not learn all that they need to be a successful university graduate at the high school level. They will benefit from taking an introductory “Computer” course.

The three questions posed at the beginning of this paper are reproduced here with the answers from this research.

1. Have the students gained additional knowledge from the class?
The answer: YES.
2. Is the difference in their pretest and posttest scores statistically significant?
The answer: YES.
3. Should our university continue offering this course in the future?
The answer: YES.

REFERENCES

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