UNIVERSITY STUDENT PERCEPTIONS OF KNOWLEDGE INTO JUDGMENT TRANSFORMATIONS AND TECHNOLOGICAL LITERACY

Edward J. Lazaros, Ball State University

Abstract

This study investigated student perceptions of knowledge into Judgment transformations and technological literacy, as they relate to student learning, in a computer-applications-in-graphic-arts university core curriculum course at a large Midwestern university. The university is composed of several colleges, so student responses were used to investigate whether the students' college influenced their perceptions. Student class level and the semester in which they took the course were also variables considered in the study. Knowledge into Judgment transformations and technological literacy were investigated because the university recently started requiring these as components in some core curricular courses.

Introduction

The use of the phrase "Knowledge into Judgment" transformations has been in use since at least 2004, when the Association of American Colleges & Universities recommended that students learn to transform information into knowledge and knowledge into judgment and action [1]. Since then, however, there has been a lack of discussion and exploration of what these transformations practically look like in the classroom. Evans and Donnelly [2], however, discuss the roles of knowledge and judgment in the professional field of nursing. They use the example of a nurse working with a patient's wound. The nurse would use knowledge of wound-healing processes to determine how well the wound has healed, and that knowledge would lead to a judgment of whether the wound is healing at an appropriate rate and whether any changes need to be made [2].

Technological literacy can be defined as the ability to effectively use technology (i.e., any tool, piece of equipment or device, electronic or mechanical) to accomplish required learning tasks [3]. Since today's college students have grown up with computers, cell phones and other new technologies, professors and administrators can sometimes believe that students must already be technologically literate when they arrive on campus. However, Tanner [4] argues that this is not the case, pointing out that children most often use the Internet for entertainment. Therefore, students need to be educated on how to use the Internet and other technology in a professional manner. As an example, Tanner [4] says that social work students need to know that all client records and reports can be subpoenaed. Thus, students need to understand confidentiality laws and the fact that any report submitted online will remain online forever [4].

Davies [3] concurs, acknowledging that people become skilled with a technology only when they know how to use it; but he goes on to say that "exposure to technology does not make someone a technology expert any more than living in a library makes a person a literary expert." He also says that students generally use technology for social activities rather than academic or professional activities. In addition, although today's students are often enthusiastic about using educational technology, interest in technology is not the same as technological literacy [3].

Eisenkraft [5] studied technological literacy and interest in K-12 students, which should be of interest at the university level since these younger students will be freshmen in college at some point in the near future. The study examined 1,157 student entries to a technology innovation competition in 2006, the Toshiba/NSTA ExploraVisions competition. Two of the study's conclusions about K-12 students have particular relevance to technological literacy at the college level:

1. These students, across the board, understand that technology is more than computers and communications.
2. Some of today's top urgent technological needs (construction, energy and power) do not get the same attention from students as the more glamorous technological fields of medicine and communications [5].

Old Dominion University is an example of a school that has made technological literacy a general education requirement for all students. All students are required to take a 100-level course, which is intended "to show the many technologies that impact and are used in differing careers" [6]. Students are also required to take a 300/400-level course, which involves focused study on a particular type of technology. Ritz [6] surveyed students in these courses, and 64% of them said they had never taken a course about technology before, either in high school or the university. Thirty

-four percent of the students agreed and 34% strongly agreed that the course helped them with career selections [6].

Problem Statement

There is a lack of information relating to Knowledge into Judgment transformations and technological literacy, with regard to student learning in a computer-applications-in-graphic-arts core curriculum university course.

Purpose of the Study

The purpose of this study was to investigate the perceptions of university students with regard to Knowledge into Judgment transformations and technological literacy, as they relate to student learning in a computer-applications-in-graphic-arts core curriculum course. These perceptions will provide the faculty involved with the course with data that could influence curricular changes.

The following research questions guided this study:

1. What are the perceptions of university students with regard to Knowledge into Judgment transformations?
2. What are the perceptions of university students with regard to technological literacy?
3. Did the students' college influence their perception?
4. Did the class influence their perception?
5. Did the semester influence their perception?

The first two research questions are descriptive in nature, so there were no hypotheses to be tested. For research question three, the null hypothesis would be that there are no differences in perception for Knowledge into Judgment transformations or technological literacy for the colleges examined. The null hypothesis for research question four would be that there are no class level differences in these perceptions. Finally, for research question five, the null hypothesis would be that semester does not impact the perceptions of Knowledge into Judgment transformations or technological literacy. All statistical tests were evaluated at an alpha level of .05.

Methodology

Descriptive research was used to investigate data from university students who took a core curriculum course relating to computer applications in graphic arts in order to answer research questions one and two. For research questions three and four, which compare college- and class-level perceptions, one-way ANOVAs were used, followed by pairwise post-hoc procedures to ascertain differences. For research question five, an independent samples t-test was used to compare semester differences in perception.

Institutional Review Board (IRB) approval was received prior to conducting this study. The student responses were anonymous and confidential. The population for this study consisted of university students (N = 190) who completed computer applications in graphic arts core curriculum courses between the fall, 2010, and fall, 2011, academic semesters. The university students were grouped by their respective colleges, which consisted of Applied Sciences and Technology, College of Architecture and Planning, College of Communication, Information and Media, College of Fine Arts, College of Sciences and Humanities, Honors College, Miller College of Business, Teachers College and University College. The university students were grouped according to class, which consisted of freshman, sophomore, junior, senior, graduate or other. Furthermore, the students were grouped according to the semester in which they completed the computer applications in graphic arts course: fall, spring or summer. The response rate of the students was 94% (N=179).

The survey instrument was used to gather information of a demographic nature in three categories: 1) College; 2) Level of Completed Education; and, 3) Semester. The survey instrument was previously developed and validated by a university committee for inclusion in a university core curriculum course as an exit instrument.

The perceptions of university students with regard to Knowledge into Judgment transformations were investigated using the following questions:

1. The course helped me analyze ethical implications of using or not using knowledge.
2. The course helped me describe effective decision-making strategies.
3. The course helped me evaluate the strengths and weaknesses of arguments and actions.
4. The course helped me use multiple sources of information and knowledge to evaluate competing aesthetic forms or ideas, form judgments and provide their rationale.

The perceptions of university students with regard to technological literacy were investigated using the following questions:

1. The course promoted the use of technology.
2. The course promoted critical thinking.
3. The course helped me integrate content knowledge.
4. The course helped me reflect on my learning.

5. The course promoted the assessment of the ethical ramifications of using technology.

Results

Students were asked to indicate the name of their colleges. Fifty-one students (28.5%) were from Applied Sciences and Technology; fifty-three students (29.6%) were from the College of Communication Information and Media; nineteen students (10.6%) were from the College of Sciences and Humanities; twenty-three students (12.8%) were from the College of Business; and, thirty-three students (18.4%) were from other colleges. See Table 1 for more information.

Table 1. College in which Students Reported Being Enrolled

	n	%
Applied Sciences and Technology	51	28.5
College of Communication, Information, and Media	53	29.6
College of Sciences and Humanities	19	10.6
College of Business	23	12.8
Other	33	18.4
Total	179	100.0

Students were asked to indicate their level of completed education. Twenty-eight students (15.6%) were freshmen; sixty-five students (36.3%) were sophomores; forty-four students (24.6%) were juniors; and, forty-two students (23.5%) were seniors. See Table 2 for more information.

Table 2. Student Level of Completed Education

Classification	n	%
Freshman	28	15.6
Sophomore	65	36.3
Junior	44	24.6
Senior	42	23.5
Total	179	100.0

Students were asked to indicate the semester in which they were taking the course. One hundred and ten students (61.5%) took the course during the fall semester; sixty-nine students (38.5%) took the course during the spring semester. See Table 3 for more information.

Table 3. Semester

Classification	n	%
Freshman	28	15.6
Sophomore	65	36.3
Junior	44	24.6
Senior	42	23.5
Total	179	100.0

Students were asked to indicate whether or not the course helped them analyze ethical implications of using or not using knowledge. The percent of students that strongly agreed that the course helped them analyze ethical implications of using or not using knowledge was 49.2% (n = 88); 43.6% (n = 78) of the students somewhat agreed; and, 7.3% (n = 13) strongly disagreed. See Table 4 for more information.

Table 4. "The course helped me analyze ethical implications of using or not using knowledge."

Likert Scale	n	%
Strongly disagree	13	7.3
Somewhat agree	78	43.6
Strongly agree	88	49.2
Total	179	100.0

Students were asked to indicate whether or not the course helped them describe effective decision-making strategies. Most students strongly agreed that the course helped them describe effective decision-making strategies (55.9%, n = 100), while 35.2% (n = 63) somewhat agreed, and only 8.9% (n = 16) strongly disagreed. See Table 5 for more information.

Table 5. "The course helped me describe effective decision-making strategies."

Likert Scale	*n*	%
Strongly disagree	16	8.9
Somewhat agree	63	35.2
Strongly agree	100	55.9
Total	179	100.0

Students were asked to indicate whether or not the course helped them evaluate the strengths and weaknesses of arguments and actions. In the core curriculum course, students participate in several assignments where they must evaluate the strengths and weaknesses of arguments and actions as they solve graphic design problems presented by the instructor. Table 6 reports whether the students strongly agreed, somewhat agreed or strongly disagreed that the course helped them in evaluating the strengths and weaknesses of arguments and actions. The students strongly agreed that the course helped them evaluate the strengths and weaknesses of arguments and actions (46.4%, n = 83), while 38.5% (n = 69) somewhat agreed, and only 15.1% (n = 27) strongly disagreed. See Table 6 for more information.

Table 6. "The course helped me evaluate strengths and weaknesses of arguments and actions."

Likert Scale	*n*	%
Strongly disagree	16	8.9
Somewhat agree	63	35.2
Strongly agree	100	55.9
Total	179	100.0

Students were asked to indicate whether or not the course helped them use multiple sources of information and knowledge to evaluate competing aesthetic forms or ideas, form judgments and provide their rationale. Most students strongly agreed that the course helped them use multiple sources of information and knowledge to evaluate competing aesthetic forms or ideas, form judgments and provide their rationale (54.2%, n = 97), while 36.9% (n = 66) somewhat agreed, and only 8.9% (n = 16) strongly disagreed. See Table 7 for more information.

Table 7. "The course helped me use multiple sources of information and knowledge to evaluate competing aesthetic forms or ideas, form judgments, and provide their rationale."

Likert Scale	*n*	%
Strongly disagree	16	8.9
Somewhat agree	66	36.9
Strongly agree	97	54.2
Total	179	100.0

Students were asked to indicate whether or not the course promoted the use of technology. Most of the students strongly agreed that the course promoted the use of technology (88.8%, n = 159), while 8.9% (n = 16) somewhat agreed, and only 2.2% (n = 4) strongly disagreed. See Table 8 for more information.

Table 8. "The course promoted the use of technology."

Likert Scale	*n*	%
Strongly disagree	16	8.9
Somewhat agree	66	36.9
Strongly agree	97	54.2
Total	179	100.0

Students were asked to indicate whether or not the course promoted critical thinking. Most of the students strongly agreed that the course promoted critical thinking (69.8%, n = 125), while 24.0% (n = 43) somewhat agreed, and only 6.1% (n = 11) strongly disagreed. See Table 9 for more information.

Table 9. "The course promoted critical thinking."

Likert Scale	*n*	%
Strongly disagree	11	6.1
Somewhat agree	43	24.0
Strongly agree	125	69.8
Total	179	100.0

Students were asked to indicate whether or not the course content helped them integrate content knowledge. Most of the students strongly agreed that the course helped them integrate content knowledge (64.8%, n = 116), while 28.5% (n = 51) somewhat agreed, and only 6.1% (n = 11) strongly disagreed. See Table 10 for more information.

Table 10. "The course content helped me integrate content knowledge."

Likert Scale	*n*	%
Strongly disagree	11	6.1
Somewhat agree	51	28.5
Strongly agree	116	64.8
Total Completed	178	99.4
Missing	1	.6
Total	179	100.0

Students were asked to indicate whether or not the course helped them reflect on their learning. Most of the students strongly agreed that the course helped them reflect on their learning (53.1%, n = 95), while 36.9% (n = 66) somewhat agreed, and only 10.1% (n = 18) strongly disagreed. See Table 11 for results.

Table 11. "The course helped me reflect on my learning."

Likert Scale	*n*	%
Strongly disagree	11	6.1
Somewhat agree	51	28.5
Strongly agree	116	64.8
Total Completed	178	99.4
Missing	1	.6
Total	179	100.0

Students were asked to indicate whether or not the course promoted the assessment of the ethical ramifications of using technology. Most of the students strongly agreed that the course helped promote the assessment of ethical ramifications of using technology (64.8%, n = 116), while 28.5%

(n = 51) somewhat agreed, and only 6.7% (n = 12) strongly disagreed. See Table 12 for results.

Table 12. "The course promoted the assessment of the ethical ramifications of using technology."

Likert Scale	*n*	%
Strongly disagree	12	6.7
Somewhat agree	51	28.5
Strongly agree	116	64.8
Total	179	100.0

Research question #3 sought to determine whether or not the students' college influenced their perception of Knowledge into Judgment transformations and technological literacy. In order to determine if there were differences in perceptions among the colleges for Knowledge into Judgment transformations and technological literacy, a one-way ANOVA was used for each measure. The assumption of equal variances was violated for both Knowledge into Judgment transformations and technological literacy, so the Welch test was used as an alternative to the F test because it is robust to this violation. No statistically significant differences among the colleges were found for Knowledge into Judgment transformation (Welch $F_{(4,71.605)} = 1.31$, $p = .274$), but technological literacy was statistically significant (Welch $F_{(4,71.987)} = 3.01$, $p = .024$), indicating that there were differences among the colleges for this measure. Because of the unequal variances, a pairwise test that does not require equal variances was used as a post-hoc procedure; therefore, the Games-Howell test was chosen. Pairwise differences indicated that the College of Business was higher than the College of Communication Information and Media and other college categories for technological literacy, but no other pairwise differences were found. See Table 13 for more information.

Research question #4 sought to determine whether or not the students' class influenced their perception of Knowledge into Judgment transformations and technological literacy. To determine if there were differences in perceptions among class levels for Knowledge into Judgment transformations and technological literacy, a one-way ANOVA was used. The equal variance assumption was met for Knowledge into Judgment but was violated once again for technological literacy. There were no statistically significant overall effects found for class level, but there was evidence that there was a linear trend present in the data for both Knowledge into Judgment transformations and technological literacy when comparing the unweighted means ($F_{(1,175)} = 4.392$, $p = .038$; $F_{(1,175)} = 5.544$, $p = .020$, respectively). This would tend to suggest that Knowledge into Judgment transformations and technological literacy appear to decline as class level increases from freshmen through senior. Table 14 illustrates perception of Knowledge into Judgment transformations and technological literacy by class.

Table 13. "Differences in perceptions among colleges for Knowledge into Judgment transformations and technological literacy."

		N	M	SD
Knowledge into Judgment	Applied Sciences and Technology	51	2.4755	.55959
	College of Communication, Information, and Media	53	2.3443	.65454
	College of Sciences and Humanities	19	2.3947	.43554
	College of Business	23	2.5761	.38755
	Other	33	2.3258	.65098
	Total	179	2.4134	.57832
Technological Literacy	Applied Sciences and Technology	51	2.6314	.44609
	College of Communication, Information, and Media	53	2.5585	.56481
	College of Sciences and Humanities	19	2.6737	.38993
	College of Business	23	2.8174	.24800
	Other	33	2.5394	.53964
	Total	179	2.6212	.48180

Table 14. "Perception for Knowledge into Judgment transformations and technological literacy by class."

		N	M	SD
Knowledge into Judgment	Freshman	28	2.5446	.50485
	Sophomore	65	2.4385	.55732
	Junior	44	2.4659	.57716
	Senior	42	2.2321	.63292
	Total	179	2.4134	.57832
Technological Literacy	Freshman	28	2.7214	.36652
	Sophomore	65	2.6646	.43172
	Junior	44	2.6682	.48598
	Senior	42	2.4381	.57803
	Total	179	2.6212	.48180

Research question #5 sought to determine whether or not the students' semester influenced their perception for Knowledge into Judgment transformations and technological literacy. No statistically significant differences were found between fall and spring semester responses with regard to their perceptions as measured by Knowledge into Judgment transformations and technological literacy. See Table 15 for more information.

Table 15. Perception for Knowledge into Judgment Transformations and Technological Literacy by Semester

		N	M	SD
Knowledge into Judgment	Freshman	28	2.5446	.50485
	Sophomore	65	2.4385	.55732
	Junior	44	2.4659	.57716
	Senior	42	2.2321	.63292
	Total	179	2.4134	.57832
Technological Literacy	Freshman	28	2.7214	.36652
	Sophomore	65	2.6646	.43172
	Junior	44	2.6682	.48598
	Senior	42	2.4381	.57803
	Total	179	2.6212	.48180

Discussion

Prior to this study, there was a lack of information relating to Knowledge into Judgment transformations and technological literacy with regard to student learning in a computer-applications-in-graphic-arts core curriculum university course, specifically. However, prior studies have examined these topics, as described in previous literature reviews [1], [2]. This study yielded information relating to the perceptions of university students with regard to Knowledge into Judgment transformations as they relate to student learning in a computer-applications-in-graphic-arts core curriculum course, which answered research question #1. Specifically, students strongly agreed that the course helped them: analyze ethical implications of using or not using knowledge (49.1% (n = 88); describe effective decision-making strategies (55.9%, n = 100); evaluate strengths and weaknesses of arguments and actions (46.4%, n = 83); and, use multiple sources of information and knowledge to evaluate competing aesthetic forms or ideas, form judgments and provide their rationale (54.2%, n = 97). These results seem to indicate that the course is doing a good job promoting Knowledge into Judgment transformations as they relate to student learning.

With regard to technological literacy, research question #2 was answered. The students strongly agreed that: the course promoted the use of technology (88.8%, n = 159); promoted critical thinking (69.8%, n = 125); integrated content knowledge (64.8%, n = 116); reflected on learning (53.1%, n = 95); and, assessed ethical ramifications of using technology 64.8% (n = 116). The course appears to be doing a good job in terms of promoting technological literacy. As noted in the literature review, technological literacy is defined as "the ability to effectively use technology to accomplish required learning tasks" [3].

When research question #3 was investigated to see whether or not the students' college influenced perceptions of technological literacy, the College of Business was statistically significant (Welch $F_{(4,71.987)}$ = 3.01, p = .024), with Games-Howell pairwise tests indicating that the College of Business was higher than the College of Communication Information and Media and the other colleges. The students coming from different colleges may have had different required courses and experiences prior to this course that were related to their choice of major. This may have been an external variable. Future studies could control for prior experiences in coursework.

Research question #4 sought to determine whether or not the students' class influenced their perceptions of Knowledge into Judgment transformations and technological literacy. For both Knowledge into Judgment transformations and technological literacy, there were statistically significant linear trends found for the unweighted means. This would tend to suggest that Knowledge into Judgment transformations and technological literacy appear to decline as class level increases from freshmen through senior.

For research question #5, no statistically significant differences were found between fall and spring semester responses with regard to their perceptions as measured by Knowledge into Judgment transformations and technological literacy.

Recommendations for Further Research

Further research should be conducted to investigate why the College of Business was higher than the College of Communication Information and Media and the other colleges. Further research should also investigate why the perceptions of Knowledge into Judgment transformations and technological literacy appear to decline as class level

increases from freshmen through senior. Open-ended responses should be considered in such a study.

References

[1] Leskes, A. (2004). Greater expectations and learning in the new globally engaged academy. *Peer Review, 6*(2), 4-7.

[2] Evans, R. J., & Donnelly, G. W. (2006). A model to describe the relationship between knowledge, skill, and judgment in nursing practice. *Nursing Forum, 41*(4), 150-157.

[3] Davies, R (2011). Understanding technology literacy: A framework for evaluating educational technology integration. *TechTrends: Linking Research & Practice to Improve Learning, 55*(5), 45-52.

[4] Tanner, R. (2011, November 11). The myth of the tech-savvy student. *Chronicle of Higher Education,* pp. B32-B34.

[5] Eisenkraft, A. (2010). Retrospective analysis of Technological Literacy of K-12 students in the USA. *International Journal of Technology & Design Education, 20*(3), 277-303.

[6] Ritz, J. M. (2011). A focus on Technological Literacy in higher education. *Journal of Technology Studies, 37*(1), 31-40.

Biography

EDWARD J. LAZAROS is an Assistant Professor of Technology at Ball State University. He earned his B.S. degree from Ball State University, MS (Technology Education) Ball State University, and Ph.D. (Educational Technology, 2005) from Purdue University. Dr. Lazaros is currently teaching at Ball State University. Dr. Lazaros may be reached at ejlazaros@bsu.edu