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THE PERCEIVED FITNESS LEVEL OF I. D. BILKENT UNIVERSITY BUSINESS INFORMATION MANAGEMENT STUDENTS

A MASTER'S THESIS

BY

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THE PROGRAM OF CURRICULUM AND INSTRUCTION
İHSAN DOĞRAMACI BİLKENT UNIVERSITY
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To Zeynep and Aslı with love

THE PERCEIVED FITNESS LEVEL OF I. D. BILKENT UNIVERSITY BUSINESS INFORMATION MANAGEMENT STUDENTS

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of
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by
Güliz Esen

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Thesis Title: The Perceived Fitness Level of I. D. Bilkent University Business Information Management Students

Güliz Esen

September 2016

I certify that I have read this thesis and have found that it is fully adequate, in scope and in quality, as a thesis for the degree of Master of Arts in Curriculum and Instruction.

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ABSTRACT

THE PERCEIVED FITNESS LEVEL OF İ. D. BİLKENT UNIVERSITY BUSINESS INFORMATION MANAGEMENT STUDENTS

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Supervisor: Assoc. Prof. Dr. Erdat Çataloğlu

September 2016

The purpose of this research study was to examine the Ihsan Doğramacı Bilkent University Business Information Management (BIM) Department students' own perception of their Fluency in Information level (FITness).

A secondary purpose of this study was to determine the possible factors affecting the BIM students' perceived FITness levels particularly as they progress through their four academic years. This was a quantitative descriptive cross-sectional study. In order to obtain data, an instrument developed by Sharp (2010) was used.

This study was conducted in the Department of Business Information Management, İ.D. Bilkent University. In December 2015, ninety-six BIM students from all years participated in this study, by responding to the same survey questions. The survey included three sections: Contemporary Skills, Foundational Concepts and Intellectual Capabilities. There were 13 Likert-type questions in the survey.

To analyze the data, frequency tables, a one-way analysis of variance (ANOVA) and Independent Samples T-Test were used. The results revealed that Fluency in Information Technology perception level mean scores of BIM students increased each academic year. Freshman BIM students had significantly lower scores than other years in terms of their contemporary skills and foundational concepts perceptions. However, there was no statistical significance in intellectual capabilities of BIM students regardless of academic year. The results also revealed no significant difference between the perception survey total scores of male and female BIM students.

Key words: Fitness, perceived computer skills, information technology fluency, information literacy, computer literacy

ÖZET

İ. D. BİLKENT ÜNİVERSİTESİ İŞLETME BİLGİ YÖNETİMİ BÖLÜMÜ ÖĞRENCİLERİNİN BİLGİ TEKNOLOJİLERİ YETKİNLİKLERİNE DAİR ÖZALGILARI

Güliz Esen

Yüksek Lisans, Eğitim Programları ve Öğretim
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Eylül 2016

Bu araştırmanın amacı, Ihsan Doğramacı Bilkent Üniversitesi İşletme Bilgi Yönetimi (İBY) Bölümü öğrencilerinin bilgi teknolojileri yetkinliklerine dair özalgılarını incelemektir.

Çalışmanın diğer bir amacı da İBY bölümü öğrencilerinin bilgi teknolojileri konusundaki yetkinlikleri ile ilgili öz algılarının, dört yıllık akademik hayatları boyunca nasıl değiştiğini ve bu algıyı etkileyen faktörleri ortaya koymaktır.

Araştırma yöntemi olarak sayısal betimleyici kesitsel yöntem, veri toplamada ise Sharp (2010) tarafından oluşturulmuş bir ölçüm aracı kullanılmıştır. Araştırma, İ.D. Bilkent Üniversitesi, İşletme Bilgi Yönetimi Bölümü'nde gerçekleştirilmiştir. Bu araştırmanın örneklemini bu bölümde farklı yıllarda okuyan toplam 96 öğrenci oluşturmaktadır. Bu öğrenciler Aralık 2015'te aynı anket sorularına cevap vererek çalışmaya katılmışlardır. Kullanılan anket üç bölümden oluşmaktadır: Çağdaş

Beceriler, Temel Kavramlar ve Düşünsel Yetenekler. Ankette Likert tipi ölçüm tekniği ile hazırlanmış 13 adet soru yer almaktadır.

Veri analizi için, frekans tablolari, tek faktörlü varyans Analizi (ANOVA) ve bağımsız örneklemler T-testi kullanılmıştır. Araştırma sonuçları, İşletme Bilgi Yönetimi Bölümü'nde okumakta olan öğrencilerin bilgi teknolojileri yetkinliklerine dair özalgıları aritmetik ortalamasının yıllara göre arttığını göstermektedir. İBY birinci sınıf öğrencilerinin çağdaş becerilere ve temel kavramlara ait öz algıları diğer yıllarda okuyan öğrencilere göre istatistiksel olarak anlamlı bir farklılık göstermektedir. Ancak İBY bölümü öğrencilerinin düşünsel yeteneklerle ilgili özalgılarında, istatistiksel olarak anlamlı bir fark görülmemiştir. Sonuçlara göre, IBY Bölümü'nde okumakta olan kız ve erkek ögrenciler arasında, anket genelinde istatistiksel bir özalgı farklılığı bulunmamaktadır.

Anahtar kelimeler: Bilgi teknolojileri yetkinliği, bilgisayar becerilerine yönelik özalgı, bilgisayar okuryazarlığı

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CHAPTER 1: INTRODUCTION

Introduction

Today information technology (IT) has become an indispensable part of people's lives. In order to meet the needs of the information age and be successful in today's competitive job market, being fluent in information technology is an essential factor for productivity.

Most of the teenagers of today are radically different from what they were twenty years ago. Prensky (2001), who has labelled them as "Digital Natives", stated that, the young generation of today have spent their entire lives surrounded by computers, video games, cell phones and all the other tools of the digital age. However, their use of IT is often limited to communicating, downloading applications and game playing. Therefore, their fluency in information technology level is far away from the skills needed to survive in the business life of the information age. In that case, whose responsibility is it to engage the young generation in advanced uses of information technology?

A university can provide students with a foundation of contemporary skills, foundational concepts and intellectual capabilities so that they can learn the rest themselves, whenever there is a need (McEuen, 2001). In addition to that, universities need to monitor the technology literacy levels of their students and make necessary arrangements in their curricula to ensure that graduates have the knowledge and skills they will need to succeed in the workforce (McEuen 2001;

Grant et al., 2009; Kaminski et al., 2009; Gibbs et al, 2011; Sardone, 2011; Dyer et al., 2013).

Background

Information technology plays an increasingly important role in the global society. Individuals living in the information age, must be able to use information technology effectively in their personal and professional lives.

The ability to use information technology is described as; to find useful information, to use information to solve problems, and to learn new technologies and applications. However, technology changes so rapidly that existing skills of individuals may easily become out of date. Therefore, in addition to having a group of computer skills, an individual should be able to adapt to changes in the technology and gain a sufficient foundation to be able to obtain new skills independently.

According to Turkish Statistical Institute (TÜİK) results, while the computer usage percentage in enterprises was 87.8% in 2005, the percentage increased to 95.9% in 2016. When computer usage in households and by individuals is considered, while 30% of males and 15.9% of females were using computers in 2005, the percentages increased to 64.1% and 45.9% respectively in 2016. In 2005, only 8.7% of households had an access to the Internet. In 2016, by contrast, 76.3% of the households have Internet connection. These statistics highlight the rising importance of every individual having good information technology skills.

In 1999, the Committee on Information Technology Literacy defined fluency with information management as being FIT or FITness. FITness has three fundamental elements: Contemporary Skills, Foundational Concepts and Intellectual Capabilities.

Universities are responsible for engaging the students in advanced uses of information technology (Kaminski et al., 2009). A university can provide students with a foundation of contemporary skills, foundational concepts and intellectual capabilities so that they can learn the rest themselves, whenever there is a need (McEuen, 2001). In addition to that, universities need to monitor the technology literacy levels of their students and make necessary arrangements in their curricula to ensure that graduates have the knowledge and skills they will need to succeed in the workforce (McEuen 2001; Grant et al., 2009; Kaminski et al., 2009; Gibbs et al, 2011; Sardone, 2011; Dyer et al., 2013).

Problem

Due to the fact that new information technologies and applications emerge almost daily, the existing skills of an individual may easily fall out of date. Therefore, in addition to having a group of computer skills, an individual would be able to adapt to changes in the technology and gain a sufficient foundation to be able to obtain new skills independently. The way individuals shop, bank, work and communicate is increasingly dependent on information technologies. Most jobs require their employees to have expertise with IT. Individuals having high-level IT skills and conceptual knowledge are favoured in the hiring process as their ability to learn new technologies will support them while growing their IT skills (Sardone, 2011). Therefore, to participate fully and confidently in the information age, people must be proficient with using information technologies.

Department of Business Information Management is a particularly good example of a department preparing students for entry level management positions in business and government, positions demanding a strong level of IT competency. Therefore, to examine the perceived fluency in Information Technology (FITness) level of BIM Students of all years will describe the possible improvement of their FITness level through their 4-year education, as well as their readiness fort he information age.

There are studies in the literature which reveal significant differences between the FITness level of male and female students due to several reasons such as socio-economic status, ethnicity and classroom management. This study will also reveal whether possible significant differences exist between male and female BIM students.

Purpose

The purpose of this research study is to examine the Ihsan Doğramacı Bilkent University Business Information Management (BIM) department students' own perception of their FITness level (Fluency in Information Technology).

A secondary purpose of this study is to determine the possible factors affecting the BIM students' perceived FITness particularly as they progress through their four academic years.

Research questions

The research questions of this study are as follows:

Main question 1:

Is there any progress in FITness scores of Business Information Management students as they progress through the 4-year program?

Sub question: Is there any significant difference between Business Information Management students' perceived FITness level mean scores in terms of years? If so, is it in favor of senior?

Main question 2:

Is there a difference between male and female Business Information Management students' perceived FITness level scores?

Significance

This study is significant in its being the first structured research study in BIM department and as far as is known in Bilkent University, which examines the students' own perceptions of their FITness levels, throughout the 4-year university program. The information gathered in this study will help establish a baseline for curriculum enhancements to the faculty, particularly to the administrators of the department. The results of this study will not only evoke further research studies on a departmental and global basis, but also will help the administrators to define the position of the BIM students' perceived fluency skills in the literature.

As a faculty member and an administrator of the BIM Department for more than 20 years, the results will also better inform the researcher's work with the students and the department.

The results of this study combined with experts' feedback and recommendations will help business departments to better prepare graduates for the information age.

Definition of key terms

FITness - Fluency in Information Technology: The ability of an individual to handle information technology. As the National Research Council states:

“People fluent with information technology are able to express themselves creatively, to reformulate knowledge and to synthesize new information”.

Computer literacy: Level of familiarity with the basic hardware and software (and now Internet) concepts that allows one to use personal computers for data entry, word processing, spreadsheets, and electronic communications (Online business dictionary, 2016).

BIM: Department of Business Information Management

One-way Analysis of Variance (ANOVA): An analysis tool used to determine whether there are any statistically significant differences between the means of three or more independent (unrelated) groups (Newbold et al., 2007).

Independent Samples T test: An analysis tool used to compare the means between two unrelated groups on the same continuous, dependent variable (Newbold et al., 2007).

Tukey’s HSD (honest significant difference) test: A single-step multiple comparison procedure and statistical test, that can be used on raw data or in conjunction with an ANOVA (Post-hoc analysis) to find means that are significantly different from each other (Newbold et al., 2007).

CHAPTER 2: REVIEW OF RELATED LITERATURE

Introduction

The aim of this research study is to examine BIM students' own perception of their FITness (Fluency in Information Technology) level. This chapter aims to analyze several research-based and theory-based articles in order to provide a wider perspective about this research study under four main parts:

The first part provides general information about using Information Technology. Besides, it also gives information about the term "Computer Literacy". The second part has information about "Fluency in Information Technology" and the four categories of rationale to understand it. In the third part, information about the importance of FITness in university education and university students' level of FITness is given. Finally, the last part provides information about the FITness level differences between male and female university students.

Using information technology

Information technology plays an increasingly important role in the global society. Individuals living in the information age, must be able to use information technology effectively in their personal and professional lives. The ability of using information technology is described as to find useful information, to use information to solve problems and to learn new technologies and applications. New information technologies and applications emerge almost daily. The way individuals shop, bank, work and communicate is increasingly dependent on information technologies. Most jobs require their employees to have expertise with IT. Individuals having high-level

IT skills and conceptual knowledge are favoured in the hiring process as their ability to learn new technologies will support them while growing their IT skills (Sardone, 2011). Therefore, to participate fully and confidently in the information age, people must be proficient with using information technologies.

The term ‘Computer literacy’ has a long history and means the ability to use a few computer applications. Therefore, this term implies competency with a few of today’s computer applications, such as word processing and e-mail. However, the technology changes so rapidly that, existing skills may easily become out of date. Therefore, in addition to having a group of computer skills, an individual would be able to adapt to changes in the technology and gain a sufficient foundation to be able to obtain new skills independently.

In 1999, the National Research Council USA, the Computer Science and Telecommunications Board and several higher education faculty published “Being Fluent with Information Technology” report. This report defined fluency with information management (being FIT or FITness) as having three fundamental elements: Contemporary Skills, Foundational Concepts and Intellectual Capabilities. This report focused on what individuals must know and understand about information technology for using it efficiently. In the next section, FITness is explained in a detailed way by summarising the first three chapters of the report.

What is FITness?

As technology develops, its users must adapt themselves to the changes and improvements, so as to use information technology for their own benefits in their personal and professional lives.

Fluency with Information Technology is ahead of traditional notions of computer literacy. While computer literacy requires a minimal level of familiarity with technological skills such as using wordprocessors, e-mail and web-browsers, FITness requires a broad understanding of information technology so as to be able to apply it both at work and at home (Lin, 2000).

As technology continuously changes, existing technological skills of a person easily become outdated. For this reason, FITness requires lifelong learning for individuals who must continuously adapt themselves to the changes and advances in information technology. Therefore, Fluency with Information Technology can be defined as the knowledge to explore, interact with, and live in a technology and information management dependent society. (National Research Council, 1999; McEuen, 2001; Sharp, 2010)

In the report published by the National Research Council and the Computer Science and Telecommunications Board (1999), it is stated that there are mainly four categories of rationale for understanding information technology: Personal, Societal, Educational, and Workforce.

Personal rationale

From keeping in contact with family and friends via e-mail, to managing finances with spreadsheets, fluency in information technology adds a value to individuals' way of lives.

Societal rationale

Some basic understanding of information technology is needed to make informed judgments about public policy issues such as copyright laws or online credit card and bank information privacy.

Educational rationale

Besides being an enabler for many new types of educational opportunities, using information technology can develop students' critical thinking abilities.

Workforce rationale

Information technology is increasingly common in almost every workplace today. Although a company can train its employees in the use of its business systems, a one-time activity will not be adequate since the systems are upgraded continuously. Therefore, for applying information technology to business problems, a labor pool well-educated in information technology will simplify such problems. In addition to that, expertise in information technology not only leads an employee to perform a job well, it can also improve job mobility either in promoting or finding a job in another company.

FITness involves three types of knowledge, which lead to deeper understanding of information technology and its uses: Contemporary Skills, Foundational Concepts and Intellectual Capabilities.

Contemporary skills are defined as the ability to use today's computer applications such as wordprocessors, spreadsheets, network browsers and mail browsers, as well as understanding the use of operating skills. These skills provide practical experience on which to build new competence.

Foundational concepts are defined as the ability to understand the basic principles and ideas of computers, networks and information systems. The concepts explain the "how" and "why" of information technology.

Intellectual capabilities are defined as the ability to apply information technology in complex situations which involves higher-level thinking in terms of information technology. These capabilities enable individuals to handle unintended and unexpected problems that may occur.

FITness levels of university students

To be successful in today's competitive job market, being fluent in information technology is an essential factor for the university graduates. As Vockley (2007) stated; "In a digital world, no organization can achieve results without incorporating technology into every aspect of its everyday practices. It is time for schools to maximize the impact of technology as well." Today, a person under the age of 25 who is not "computer literate" will have a difficult time pursuing almost any career (Lin, 2000).

There are contradicting beliefs about university students' FITness. The pervasive use of computers at home and school, before coming to university, has created the belief that, most of the freshman students are computer literate. However, the contradicting belief argues that, incoming freshman students do not have the information technology needed to be successful and they perceive themselves as more FIT when they graduate from the university.

Most of today's teenagers are radically different than they were twenty years ago. Prensky (2001), who has labelled them as "Digital Natives", stated that, they have spent their entire lives surrounded by computers, video games, cell phones and all the other tools of the digital age. However, their use of IT is often limited to communicating, downloading applications and game playing. Therefore, their level of FITness is far away from the skills needed to survive in the business life of the information age.

Universities are responsible for engaging the students in advanced uses of information technology (Kaminski et al., 2009). However, they cannot teach all there is to learn about FITness. Even so, a university can provide students with a foundation of contemporary skills, foundational concepts and intellectual capabilities so that they can learn the rest themselves, whenever there is a need (McEuen, 2001).

Today, most universities offer IT courses to their students in all departments. In addition to these IT courses, uses of information technology are integrated to some other courses in the curricula as well. Therefore, it may be assumed that the information technology skills of university students will naturally increase each academic year. However, according to the literature, when assessed for their levels of FITness, the results can either be encouraging or disappointing. Therefore universities need to monitor the technology literacy levels of their students and make necessary arrangements in their curricula to ensure that graduates have the knowledge and skills they will need to succeed in the workforce (McEuen 2001;

Grant et al., 2009; Kaminski et al., 2009; Gibbs et al, 2011; Sardone, 2011; Dyer et al., 2013).

In Kaminski, Switzer and Gloeckner's (2009) research study, first of all, data were collected from a large sample of freshmen about their own perceived FITness, in a medium-sized university. Four years later, data were collected again, from a random stratified sample of seniors. The results revealed that students' perception of skills in presentation software and browsers significantly increased, skills in wordprocessors and spreadsheets did not change, whereas skills in database and programming significantly decreased. It was stated that, both freshmen and seniors perceived high proficiency in word processing whereas both sides perceived moderate proficiency in using spreadsheets. The researchers claimed that the decrease in some of the skills could be due to their increased awareness of the skills needed in business life.

In another study conducted by Johnson et al. (2006), it was found that there was a decrease in students' level of computer literacy from the freshman year to the senior year. The researchers stated that, the decrease in skills was possible due to the fact that, other than word processors and presentation applications, the students did not require using computer technology in their classes.

In a research study conducted in Gaziantep University, 394 undergradute business students' attitudes towards IT and their competence in IT were studied (Seyrek, 2010). The results revealed that, although most of the students owned computers and had a good level of access to IT resources, their perceived level of IT competency was low. The researcher suggested that, the students used computers mostly for playing games or social networking, however using IT skills were seldom required in courses. The results of the analysis of variance revealed that, senior students' perception of their IT skills were higher than the freshmen. In addition to that, female students' perceived IT competency level was found to be lower than male students.

To compare the perceived and actual IT skills, Grant et al. (2009) conducted a research study in a medium sized public university in North Carolina. This study explored 200 business students' perceived computer skills, as well as evaluating their actual scores on a computer skills assessment. The results were compared to enhance an introductory business computer applications course. The students' perceptions were collected with a survey and their actual performances were measured by a computer skills assessment which focused on three computer application skills – word processing, presentation, and spreadsheet. The findings of the study indicated some differences in the students' perception of their word processing skills and actual performance, no difference in perception and performance for their presentation skills, and a significant difference in perception and performance for their spreadsheet skills. As a result of this research, the curriculum for the introductory course was redesigned to concentrate primarily on the substantial skill deficiency in spreadsheet skills.

Wallace and Clariana (2005) conducted a study of 140 incoming freshman business majors to determine their computer knowledge and skills to see if an introductory computer fundamentals course was necessary at the college. The participants were given two tests, one for computer concepts and the other for the spreadsheet application MS Excel. The post-test results were significantly higher than the pretest results The findings of that study revealed that incoming students did not have a basic knowledge of computer concepts and programs, despite expectations.

Hardy, Heeler and Brooks (2006) conducted a similar research study in Northwest Missouri State University. The students would be exempted from the computer literacy course, if they received a score of 80% from various skill tests. However, out of 164 students, only 3 of them scored over 80% in all the tests. 70% of the students showed less than 60% mastery in the spreadsheet skills test. Students' database skills proficiency was even poorer. On the other hand, 21% of the students succeeded to have over 80% mastery in word processors. Therefore, the students' word processing skills were much better than their spreadsheet and database skills.

McEuen (2001) conducted a study at Southwestern University in Georgetown. She explored how FIT the students believed they were. Three hundred participants from different majors and years filled out the survey. Later on, personal interviews were held by 17 of them for discussing on their fluency levels. It was found that female students used computers primarily for communication whereas male students used them for entertainment. Parallel to the results of McEuen's study (2001), male students rated their level of IT fluency significantly higher than female students.

FITness level differences between male and female university students

The concern about the gender gap in FITness levels has been attributed to several reasons. Shashaani (1997) has hypothesized that there are differences between male and female students in their attitudes toward computers. In her research study, the results revealed that males were more interested in computers than were females and had more self-confidence in working with computers.

In the report published by British Educational Communications and Technology Agency (2008), it was also stated that, most studies had found that girls' confidence with information technologies was lower than boys'. However, it was also stated that, gender differences should be considered with a number of factors, such as socio-economic status, ethnicity, identity, pedagogy and classroom management. Analyses of multiple studies showed that, girls depended on schools to teach them about information technologies, whereas boys already spent more time with computers out of school.

Supporting the report of BECTA (2008), Volman et al. (2005) reported that girls use the computer less than boys. This study included a significant number of students from Islamic ethnic minority groups. Therefore, due to the possible inequality between the sexes, the parental attitude could be in favor of boys to deserve a computer more than girls did. On the other hand, the findings in Ballantine et al.'s (2007) study contradicted these findings since the surveyed students were from an ethnic group where gender equality was accepted.

Male students tend to favor the technical aspects of computers such as hardware, where girls prefer standard applications and social uses of computer.

According to the findings of Lee's study (2003), girls rated themselves less confident than boys in their perceived information technology skills. In this cohort study, the proportion of male respondents who rated themselves as experts had grown almost threefold, whereas that of girls had a very small increase. However, it must be pointed out that, males have a tendency to overestimate their information technology skills (Lee, 2003; Ballantine, 2007; Madigan, 2007; Nash, 2009). Madigan (2007) found that male students perceived themselves to be significantly more proficient when surveyed, however, their actual performances demonstrated no difference from the female students. Therefore, the differences between males and females should be treated with caution.

Global organizations of assessment

There are some global entreneurships that provide certification programmes for qualified computer operators.

ECDL - The European Computer Driving License

ECDL Foundation is a non-profit organization dedicated to raising digital competence standards in the workforce, education and society. In 1995, the ECDL certification programme was developed by the Council of European Professional Informatics Societies (CEPIS). The ECDL certification programmes are delivered through an active network in more than 100 countries. In non-European countries, ECDL is also known as International Computer Driving Licence (ICDL). ECDL / ICDL certification is a globally recognised information technology and digital literacy qualification.

To obtain ECDL certification, an individual must pass a test about basic IT knowledge as well as six practice-based tests of competence using a computer and popular computer applications. (http://www.ecdl.org).

Microsoft certification

The Microsoft Imagine Academy program prepares educators and students for industry recognized certifications. Earning a Microsoft Certification, students can demonstrate their skills on the latest technologies and have a firm measure and increased confidence in their skills (https://www.microsoft.com).

Microsoft Office Specialist (MOS) certification validates mastery of Microsoft Office skills. Earning MOS certification proves the ability to use Office applications for entering the workforce.

CHAPTER 3: METHOD

Introduction

The purpose of this research study is to examine Business Information Management students' perceived Fluency in Information Technology level (FITness) as they progress through the 4-year university program at Bilkent University.

A secondary purpose of this study is to seek possible explanations for Business Information Management Students' possible progress in their perceived FITness scores.

The research questions of this study are as follows:

Main Question 1:

Is there any progress in FITness scores of Business Information Management students as they progress through the 4-year program?

Sub Question:

Is there any significant difference between Business Information Management students' perceived FITness level mean scores in terms of years? If so, is it in favor of senior?

Main Question 2:

Is there a difference between female and male Business Information Management students' perceived FITness level scores?

This chapter consists of six main parts, namely research design, context, participants, instrumentation, data collection and data analyses procedures. The first part provides information about the type of research design used in this study to find possible answers to the research questions. The second part provides information about where and when the study was conducted. The third part focuses on participant and the sampling strategy. This part also provides detailed information about the participant numbers, gender distribution and years. The fourth part, titled instrumentation, is about the tools used in the present research in order to find possible answers to each research question. The fifth part focuses on data collection methods. The sixth and final part elaborates on how data were analyzed and reported for each research question.

Research design

This was a quantitative descriptive cross-sectional study. Quantitative descriptive studies are aimed at determining and reporting the way things are. (Gay et al., 2012). Therefore, either observational or survey methods are frequently used to collect descriptive data. Descriptive studies report summary data such as measures of central tendency including the mean, median, mode, standard deviation and percentage. Sample surveys are sometimes referred to as cross-sectional since data is collected at some point in time from a sample which hopefully represents all relevant subgroups in the population.

The current study mainly intended to determine Business Information Management Students' FITness perception levels and the potential explanations for their possible FITness level progress through the 4-year program. In addition to that, the current study aimed to determine whether there was a difference between female and male Business Information Management Students' perceived FITness levels.

In order to obtain data, an instrument developed by Sharp (2010) was used. Data collected from the surveys were then digitized so that they could be analyzed through computer programs such as SPSS. After the summary tables were created, a meeting was held with the department chair and the assistant chair. During this meeting, the aim was to discuss the results and find explanations that might account for the possible increase in the FITness mean scores.

In order to answer the first main research question and its sub-question, an analysis of variance (ANOVA) was conducted. ANOVA is a statistics that finds out if there is a significant mean difference among groups. If the result of ANOVA is positive, then a follow up test is conducted, in order to reveal the mean score differences for each group (Newbold et al., 2007).

For Research Question 2, independent samples t-test was conducted to compare the means of perceived FITness level scores of male and female students.

Context

This study was conducted in the Department of Business Information Management, Ihsan Doğramacı Bilkent University, Ankara. The students participated in this research by responding to the "Perceptual IT Fluency Skills Survey" questions (Sharp, 2010). To conduct the survey in classes, the related course instructors were contacted, and their permission was asked to hold the surveys in their classes. The survey data were collected during ten different sessions. The students participated in this study by responding to the same survey questions by using paper and pencil. The surveys were administered in December 2015. At the beginning of each session, the purpose of the study and what FITness means were explained to the students briefly, and oral instructions were given by the researcher. Also, the students were kindly reminded to be as careful and honest as possible. Each session took approximately half an hour.

Department of Business Information Management

Department of Business Information Management offers a 4-year Bachelors of Science degree. The core elements of the program are Business Administration, Information Management and Communication Studies in Business. In BIM, an applied education is insured through IT courses together with computer use merged into many non IT courses. Also during industrial training internships students enrich their learning with practical business experience. The mission of the department is to have graduates with a profile, that fits to Turkey’s employment policy as well as the expectations of related sectors in a wide range. The curriculum (see Appendix 2) is designed in a way that, the knowledge learned in a course constitutes a ground for the subsequent courses.

The courses on information management focus on quantitative reasoning, analytical thinking and problem solving. By the time they graduate, Business Information Management students have extensive hands-on experience, as well as an advanced level of business-oriented applications. They also learn how to evaluate, select, implement and manage information systems.

During the second semester of the first year, BIM students take a course named Business Computer Applications I. In this course, they learn the fundamental concepts of information technology, managing computers and organizing file structures and the use of word processor and presentation programs. In their third semester, they take another course named Business Computer Applications II, in which they learn advanced use of spreadsheets. These two courses provide a strong basis for the other IT courses they will take in subsequent semesters such as, Problem Solving and Algorithms, Database Management Systems, Web Site Development, Web Based Application Development, Information Systems Analysis and Management Information Systems (see Appendix 2).

Since it is the aim of the “Information Management” element of BIM’s 4-year Curriculum, to develop the skills needed to succeed in any sector of today’s technology based workplaces, it is, thus, good to know the students’ perception of their information technology fluency skills, as they progress through each academic year. In addition to that, the information gathered will help establish a starting point for curriculum development, as well as new learning initiatives.

Participants

This research study was conducted with 96 undergraduate students from all years. Data were collected in December 2015. At that time, there were 135 registered students in the department.

The students participated in this study on a voluntary basis. The researcher collected data during classes, those were offered by BIM department instructors to only BIM students.

Table 1 presents the response rates of participants according to years.

Table 1
Response rate for BIM students according to years

Years	Total number of students	Number of respondents	Response rate %
Freshman	39	23	59%
Sophomore	44	29	66%
Junior	31	24	77%
Senior	21	20	95%
Total	135	96	71%

Table 1 indicates that, as students progress through the years, the survey participation rates increase. The reason for this is that during their first two years, students attend common core courses, such as Turkish I and II, English and Composition 1, Introduction to Sociology, which include students from many different departments. These mixed-student courses were not suitable for the survey. This resulted in the relatively moderate to high participants for Freshman students (59%), growing progressively to the 95% participants for seniors.

Male students outnumber females 2:1 in BIM. As shown in Tables 2 and 3 below, this distribution varies little during the 4 academic years, and the overall response rate of 71%, which is high, is exactly the same for both male and female students.

Table 2 presents the response rates for BIM students according to gender.

Table 2
Response rate for BIM Students according to gender

Gender	Total number of students	Total number of respondents	Response rate %
Male	93	66	71%
Female	42	30	71%
Total	135	96	71%

Table 3 presents the gender distribution of the respondents according to their years.

Table 3
Gender distribution of the participants according to years

Years	Male	Female	Total
Freshman	15 (65%)	8 (35%)	23
Sophomore	22 (76%)	7 (24%)	29
Junior	15 (62%)	9 (38%)	24
Senior	14 (70%)	6 (30%)	20
Total	66 (69%)	30 (31%)	96

Instrumentation

Surveys are one of the most commonly used research tools to collect descriptive data from a large number of participants in a short period of time. Surveys can be utilized to investigate personal facts, behaviours and opinions of a group of people (Borg & Gall, 1989). Therefore, a survey was chosen to be used as an instrument to conduct this study (Appendix 1). The survey was developed by Sharp (2010). She has developed the "Perceptual Information Technology Fluency Skills Survey" to measure students' perceptions of their information technology (IT) fluency skills, using a rigorous judgment-quantification process.

Why is measuring students' own perceptions of FITness skills important? Having IT skills is the gateway to membership in the global information society and a requirement for the workforce in the future. Although university students of today are part of a generation that grew up with computers and the Internet, and most of them having already taken related courses during high school, many studies have shown that their fluency in IT skills are not high. Despite their widespread use of the Internet and social media, university students of today are not ready to live, learn and work in a technology-driven society. Therefore, knowing the perception, as well as the actual FITness skills of their students will support Business Information Management departments in determining their situation in terms of providing an adequate FITness education for their students.

Sharp (2010) developed the "Perceptual IT Fluency Skills Survey" based on the National Research Council's IT fluency report of 1999. This report challenged the term "computer literacy". Business Dictionary defines computer literacy as ;
"Level of familiarity with the basic hardware, software and Internet concepts that allows one to use personal computers for data entry, Word processing, spreadsheets and electronic communications. "

The Computer Science and Telecommunications Board of the National Research Council (NRC) created the concept of "Fluency with Information Technology" (FITness), which goes beyond the term of "computer literate" (1999). FITness requires that, people understand information technology well enough to apply it productively in work situations and in their daily lives, to recognize when information technology would assist or delay the achievement of goals, and to adapt to changes in and advancement of information technology.

The draft Perceptual IT Fluency Skills Survey (Sharp, 2010) was validated by a panel of experts. The seven members of the panel were asked to judge the items for clarity, relevance, and item content, via e-mail. After all correspondence was received regarding the content validity for each item, a focus group evaluated the instrument for overall comprehensiveness. The Content Validity Index (CVI) for the revised instrument was 1.00. Therefore, it was reported that the survey items adequately and representatively reflect the students' IT fluency skills perceptions.

The survey included three sections. These were contemporary skills, foundational concepts, and intellectual capabilities. There were 13 Likert-type items in the survey. A sample copy of the survey can be seen in Appendix 1.

Part 1 - The Contemporary Skills section was composed of five items, related to the student's ability to use operating systems, word processors, slide show presentation programs, spreadsheets and to use technology for finding information. The point scales for Part1 - Contemporary Skills were determined as:

1= No knowledge, 2= Some knowledge, 3= Average knowledge, 4= Expert knowledge. Part 1 - Contemporary Skills questions were numbered from one to five.

Part 2 - The Foundational Concepts section was composed of four items, which focused on the student's knowledge of computer operations and identifying hardware/software problems. The point scales for Part 2-Foundational Concepts were determined as:

1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree.

Part2 - Foundational Concepts questions are numbered from six to nine.

Part 3 - The Intellectual Capabilities section was composed of four items. However, two of these questions had sub-items. Therefore, there were a total of fourteen items. This part focused on the ability of the student to manage computer problems, adapt to new technology and communicate the concepts with other people. The point scales for Part 3-Intellectual Capabilities were determined as:

1= Strongly disagree, 2= Disagree, 3= Neutral, 4= Agree, 5= Strongly agree.

Part 3 – Intellectual Capabilities questions were numbered from ten to thirteen. Question ten and thirteen included six sub-questions sharing the same beginning sentence.

Table 4 presents the parts of the survey and the item numbers.

Table 4
Parts of the survey and the item numbers

Part 1 – Contemporary Skills	Item numbers: 1, 2, 3, 4, 5
Part 2 – Foundational Concepts	Item numbers: 6, 7, 8, 9
Part 3 – Intellectual Capabilities	Item numbers: 10 (a, b, c, d, e, f), 11, 12, 13 (a, b, c, d, e, f)

Method of data collection

After deciding to use the "Perceptual IT Fluency Skills Survey" as the instrument of this study, the two experts mentioned above filled out the survey in November 2015, in order to detect the possible problems and questions that could be asked by the students while answering the survey questions. Following the direction of the comments made by the colleagues, a cover page was added as the first page, which included instructions and information about the survey. In the insructions part, it was written that, the survey would not be used for grading purposes in any course, and the answers provided by the participants would be kept confidential. There was also a reminder to fill out the survey as carefully and honestly as possible. Additionally, the students were asked to write down their student identification numbers, so that their demographic information, as well as their academic information could be reached.

The survey data were collected during ten different sessions in December 2015. The BIM students participated in this study on a voluntary basis. They responded to the survey questions by using paper and pencil. The researcher collected the data by visiting the classes. At the beginning of each session, the purpose of the study and what FITness means were briefly explained to the students, and oral instructions were given by the researcher. The researcher was present in every session. There was no time limit for filling out the survey. Every session ended in approximately 30 minutes.

Method of data analysis

Statistical Package for the Social Sciences (SPSS) 20.0 and Microsoft Excel were used to analyse the descriptive data.

For the first main research questions and its sub-question, frequency tables were created and an analysis of variance (ANOVA) was conducted. If statistically significant differences were revealed, post hoc Tukey follow-up tests ($p < .05$) were conducted to find the students' perceived FITness (Fluency in Information Technology) level means that are significantly different from each other.

For the second main research question, independent samples t-test was conducted to compare the means of perceived FITness level scores of male and female students.

CHAPTER 4: RESULTS

Introduction

This chapter provides detailed information about the method and the results of data analyses. Each research question is analyzed sequentially and presented afterwards. Therefore, the chapter consists of 3 main sections devoted to the analysis of each research question and the sub questions.

The first section provides detailed information about how the first research question was addressed and presents the results of the findings. This section covers important findings about the perceived FITness levels of BIM students. The second section addresses information about how the second research question was analyzed and presents the results of the findings. This section covers important findings about the possible differences between male and female BIM students' perceived FITness levels.

To answer the research questions, all the items in the survey were analyzed separately in three parts. Table 5 shows the three parts and the items numbers of the survey questions below.

Table 5
Parts of the survey and related item numbers

Part 1	Contemporary Skills – Ability of using application programs Item numbers: 1, 2, 3, 4, 5
Part 2	Foundational Concepts – Knowledge of computer operations Item numbers: 6, 7, 8, 9
Part 3	Intellectual Capabilities – Ability to manage computer problems Item numbers: 10 (a, b, c, d, e, f), 11, 12, 13 (a, b, c, d, e, f)

The results for research question 1

The first research question was “Is there any progress in FITness scores of Business Information Management students as they progress through the 4-year program?” The first sub question was “Is there any significant difference between Business Information Management students’ perceived FITness level mean scores in terms of years? If so, is it in favor of senior?” The second sub question was “What might be the possible explanations that contribute to the progress of Business Information Management students’ perceived fitness level progress?”

To explain the first research question, initially descriptive statistics was used. The percentages of BIM Students’ responses were reported by using frequency tables. Secondly, an analysis of variance was conducted for each item in order to compute if there were statistically significant differences between the mean scores of BIM students.

In the following part of this section, first of all, the data will be described by frequency tables and graphs. Next, ANOVA results for all students will be reported. Lastly, the total mean scores for each part and item wise mean scores will be described by frequency tables and analyzed by ANOVA.

Perceptual IT fluency skills survey results

The maximum total score of the Fluency in Information Technology Perception Survey (Sharp, 2010) was 110 points. As displayed in Figure 1 below, among the 96 participants, the lowest score taken was 59 points and the highest score was 95 points. The total mean score was 79.99 with a standard deviation of 6.97. More than 30% of the total participants’ scores were piled up in the 76-80 points range.

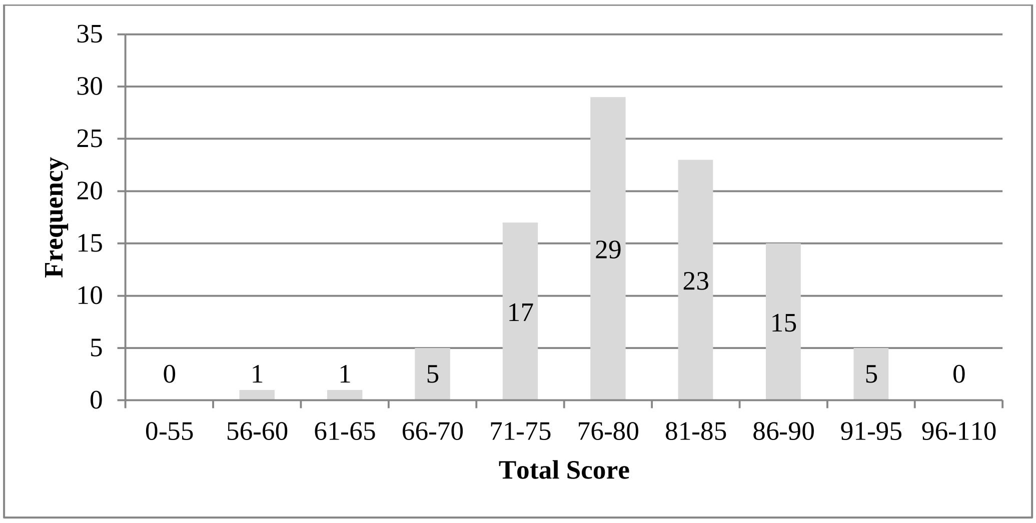

Figure 1. Frequency of fluency in IT perception survey total scores

As displayed in Figure 2 below, the total perception mean score for freshman was 74.35, compared to 81.17 for sophomore students. The junior and senior total perception mean scores were 80.92 and 83.65 respectively. Therefore, there was a 6.82 points positive difference between freshmen and sophomore students. Sophomore and junior students' total perception mean scores were very similar, with a slight -0.25 points negative difference. Lastly, there was a 2.73 points positive difference between junior and senior in favor of senior students.

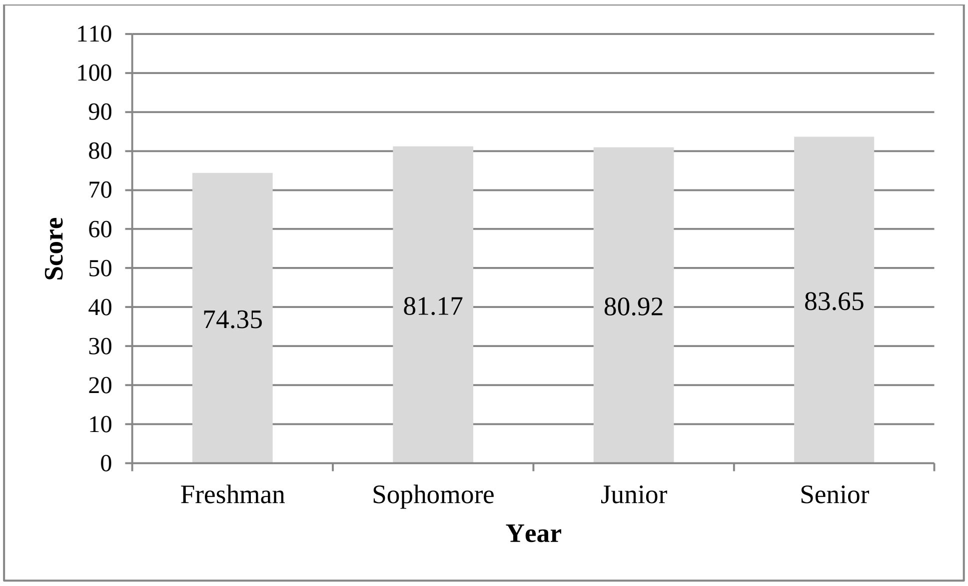

Figure 2. Fluency in IT perception survey total mean scores by years

The sub question “Is there any significant difference between Business Information Management students’ perceived FITness level mean scores in terms of years?”, was tested by one way ANOVA, and the follow up test TUKEY was used to determine which pairs differed from each other. The results of TUKEY procedure are presented in the summary Table 6 below.

Table 6
ANOVA and Tukey test results of the total perception scores

Years	n	Mean	SD	Freshman	Sophomore	Junior	Senior
Freshman	23	74.35	5.382		*	*	*
Sophomore	29	81.17	5.788	*			
Junior	24	80.92	7.401	*			
Senior	20	83.65	6.150	*			

(*) Students’ mean scores in different years that is significantly different. ($p < .05$)

As seen in Table 6, the perception survey total mean score of the freshmen was significantly lower than other years ($p<.05$). However, no significant difference was observed between sophomore, junior and senior students’ FITness mean scores.

As mentioned before, Fluency in Information Technology Perception Survey (Sharp, 2010) had 3 parts, Part 1 – Contemporary Skills, Part 2 – Foundational Concepts, and Part 3 – Intellectual Capabilities.

In the following section, the total mean scores for each part and item wise mean scores will be described and analyzed.

Part 1 – Contemporary Skills

Descriptive statistics

The maximum score that could be taken from Part 1 – Contemporary Skills was 20 points. As displayed in Figure 3 below, the lowest score was 7 points and the highest score was 20 points. The total mean score of contemporary skills was 15.52 with a standard deviation of 2.61. The figure displays that more than 75% of the scores were piled up between 13-18 points.

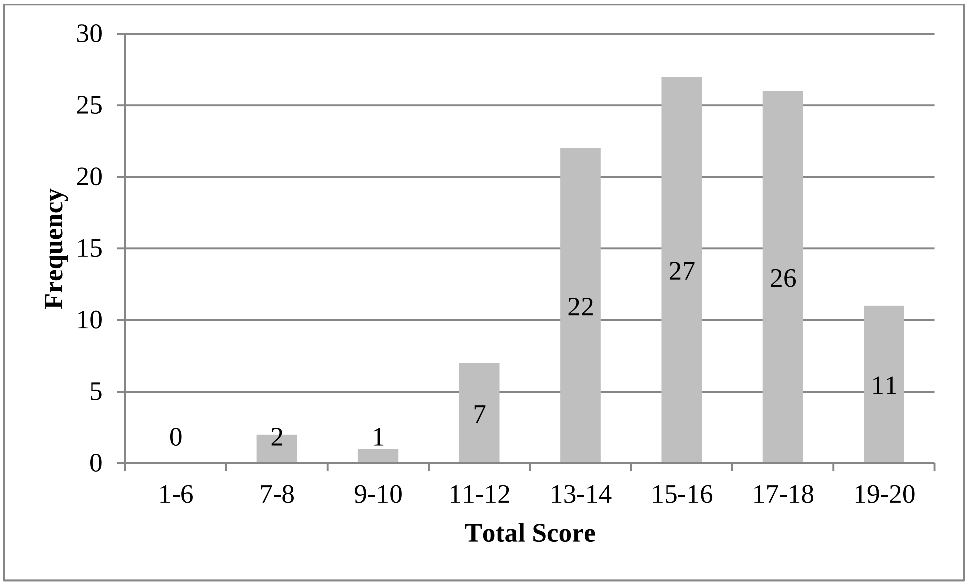

Figure 3. Frequency of part 1 – Contemporary skills total scores

Figure 4, below, shows the perception mean scores of all students, by contemporary skills. As displayed in the figure, the contemporary skills total perception mean score for freshman was 13.09, compared to 15.62 for sophomore students. The junior and senior total perception mean scores were 16.42 and 17.10 respectively. Although there is a steady positive increase in the mean scores from freshmen to senior students, the highest difference was between the freshman and sophomore by 2.53 points.

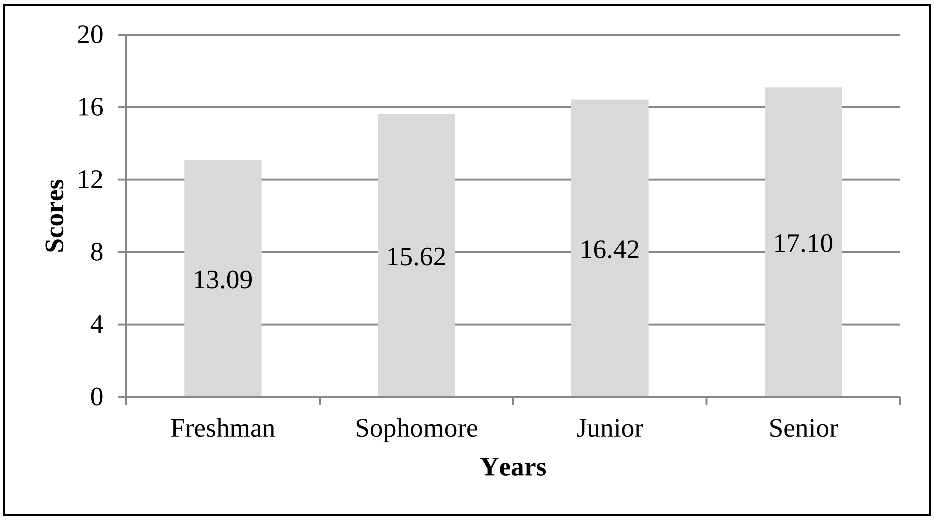

Figure 4. Part 1 – Contemporary skills total mean scores by years

Table 7 provides all participants' results for the five items in Part 1 of the survey.

Table 7
Frequency percentages of part 1 – Contemporary skills items for all participants

Part 1 - Contemporary Skills	No knowledge %	Some knowledge %	Average knowledge %	Expert knowledge %
Item 1 Using Basic Operating System Features	1	11	57	30
Item 2 Using Wordprocessors	0	7	45	48
Item 3 Using Presentation Applications	1	15	55	29
Item 4 Using Spreadsheets	7	21	52	20
Item 5 Using Instructional Materials	3	19	55	23

As seen in Table 7, BIM students recorded the highest scores in using word processors. Almost half of them (48%) rated themselves as experts. However, for the other items, mostly, they rated their skills as average. According to the table, their weakest skills were in using spreadsheets. Almost one third of the students admitted that they had either 'no knowledge' (7%) or only 'some knowledge' (21%) in using spreadheets.

To examine the contemporary skills perception level scores of BIM students item wise by years, a summary frequency table was created. Table 8 below provides the students' results for the five items in Part 1 of the survey in accordance with their years.

Table 8
Frequency percentages of part 1 – Contemporary skills items for all participants by years

Part 1 - Contemporary Skills	Years	N	No knowledge %	Some knowledge %	Average knowledge %	Expert knowledge %
Item 1 Using Basic Operating System Features	Fr	23	4	22	70	4
	So	29	0	14	52	34
	Ju	24	0	0	58	42
	Se	20	0	10	50	40
Item 2 Using word processors	Fr	23	0	9	74	17
	So	29	0	14	41	45
	Ju	24	0	4	42	54
	Se	20	0	0	20	80
Item 3 Using Presentation Applications	Fr	23	0	39	57	4
	So	29	0	10	55	34
	Ju	24	0	8	58	33
	Se	20	5	0	50	45
Item 4 Using Spreadsheets	Fr	23	26	43	30	0
	So	29	3	14	66	17
	Ju	24	0	17	46	38
	Se	20	0	10	65	25
Item 5 Using Instructional Materials	Fr	23	13	30	43	13
	So	29	0	24	62	14
	Ju	24	0	17	63	21
	Se	20	0	0	50	50

As seen in the table, there was a drastic gap between the perception level of freshman students and the other years, in using basic operating system features. Only 4% of freshmen rated themselves as experts, whereas, 34% of sophomore, 42% of junior and 40% of senior students rated themselves as experts.

It was obvious that, even freshman BIM students' had an average level of skills in using word processors. However, the 28% positive difference between freshman and sophomore, and the 26% positive difference between junior and senior students in the expert knowledge column was remarkable. It was an impressive result that 80% of senior students claimed that they were experts in using word processors. The table revealed that BIM students' word processing skills perception scores improved more than the other contemporary skills through the 4-year program.

The table displays another remarkable difference between the freshmen (4%) and sophomore (34%) students who rated themselves as experts in using presentation applications. It is worth to state the decrease in the percentages in 'Some knowledge' column and the increase in 'Expert knowledge' column by years.

Contrary to the first 3 items described above, 26% of the freshman students rated themselves as having no knowledge in using spreadsheets. Although the increase was not as remarkable as it was in the first three items, while there were no students who rated themselves as experts in using spreadsheets, 17% of sophomore students did so. This percentage increased to 38% for junior students and then decreased back to 25% for senior students.

In terms of using instructional materials, the percentage of students rating themselves as 'experts' were similar for freshman (13%), sophomore (14%) and junior (21%). Though, for senior students, the percentage jumped to 50%, which is a noteworthy increase.

The frequency tables revealed that the contemporary skills of BIM students improved from year to year. However, the major improvement was between the freshman and sophomore. In all items the ‘some knowledge’ percentages decreased and the ‘average knowledge’ and ‘expert knowledge’ percentages increased.

Since the results indicated possible significant differences between students, in addition to descriptive statistics, an analysis of variance test was conducted to determine the possible significant differences between years.

One way ANOVA and Tukey follow up test results for part 1 – Contemporary skills

In order to find out if there was a statistically significant mean difference between contemporary skills total perception mean scores of students from different years, firstly a one way ANOVA, and secondly the follow up test TUKEY were conducted to determine which pairs differed from each other. The results of TUKEY procedure are presented in the summary Table 9 below.

Table 9
ANOVA and Tukey test results for part 1 – Contemporary skills

Years	n	Mean	SD	Freshman	Sophomore	Junior	Senior
Freshman	23	13.09	2.353		*	*	*
Sophomore	29	15.62	2.426	*			
Junior	24	16.42	1.932	*			
Senior	20	17.10	1.889	*			

(*) Students’ mean scores in different years that is significantly different. ($p < .05$)

As seen in Table 9, the contemporary skills perception mean score of the freshmen (M=13.09, SD= 2.353) was significantly lower from sophomore (M=15.62, SD= 2.426), junior (M=16.42, SD=1.932) and senior (M=17.10, SD= 1.889) students’ mean scores ($p< .05$).

While the mean scores increased by years, the standard deviations decreased, indicating that, during the first two years, the scores were more dispersed, however, as years passed, students had closer scores.

Since the mean score of freshmen (M=13.09, SD=2.35) was significantly different from all other years (p< .05), each item in Part 1 – Contemporary Skills was analyzed item wise. The descriptive data and the significances for the 5 items of Contemporary Skills are displayed in Table 10.

Table 10
ANOVA and Tukey results for part 1 – Contemporary skills items

Part 1 Contemporary Skills	Years	Mean	SD	Years			
				Fr	So	Ju	Se
Item 1 Using operating system features **(Group Mean=3.17)**	Fr	2.74	0.62		*	*	*
	So	3.21	0.68	*			
	Ju	3.42	0.50	*			
	Se	3.30	0.66	*			
Item 2 Using word processors **(Group Mean=3.41)**	Fr	3.09	0.52				*
	So	3.31	0.71				*
	Ju	3.50	0.59				
	Se	3.80	0.41	*	*		
Item 3 Using presentation applications **(Group Mean= 3.13)**	Fr	2.65	0.57		*	*	*
	So	3.24	0.64	*			
	Ju	3.25	0.61	*			
	Se	3.35	0.75	*			
Item 4 Using spreadsheets **(Group Mean=2.84)**	Fr	2.04	0.77		*	*	*
	So	2.97	0.68	*			
	Ju	3.21	0.72	*			
	Se	3.15	0.59	*			
Item 5 Using instructional materials **(Group Mean= 2.98)**	Fr	2.57	0.90				*
	So	2.90	0.62				*
	Ju	3.04	0.62				
	Se	3.50	0.51	*	*		

(*) Students' mean scores in different years that is significantly different. (p < .05)

In terms of Contemporary Skills, in parallel with the frequency table results, BIM students were most confident in using wordprocessors (M=3.41). They rated themselves moderately confident in using operating system features (M=3.17) and presentation applications (M=3.13). The students were least confident in using instructional materials (M=2.98) and using spreadsheets (M=2.84).

As seen in Table 10, for all items in Part 1 – Contemporary Skills, the mean scores increased in years, with the exception of Item 1, where junior students' mean score was only 0.12 points higher than senior Students. In Items 2, 4, and 5, the standard deviations decreased from freshman to senior indicating that the students groups became more homogenious as years passed.

For Items 1, 3 and 4, freshmen's perception mean scores were significantly lower than the sophomore, junior and senior students ($p<.05$). There was no significant difference between the mean scores of sophomore, junior and senior students.

For Items 2 and 5, freshmen and sophomore students' perception mean scores were significantly lower than senior students. However, there was no significant difference between the mean scores of junior and senior students.

Part 2 – Foundational Concepts

Descriptive statistics

The maximum score that could be taken from Part 2 – Foundational Concepts was 20 points. As displayed in Figure 5 below, the lowest score was 7 points and the highest score was 20 points. The total mean score of foundational concepts was 14.92 with a standard deviation of 2.80. The figure displays that almost half of the scores were piled up between 13-16 points.

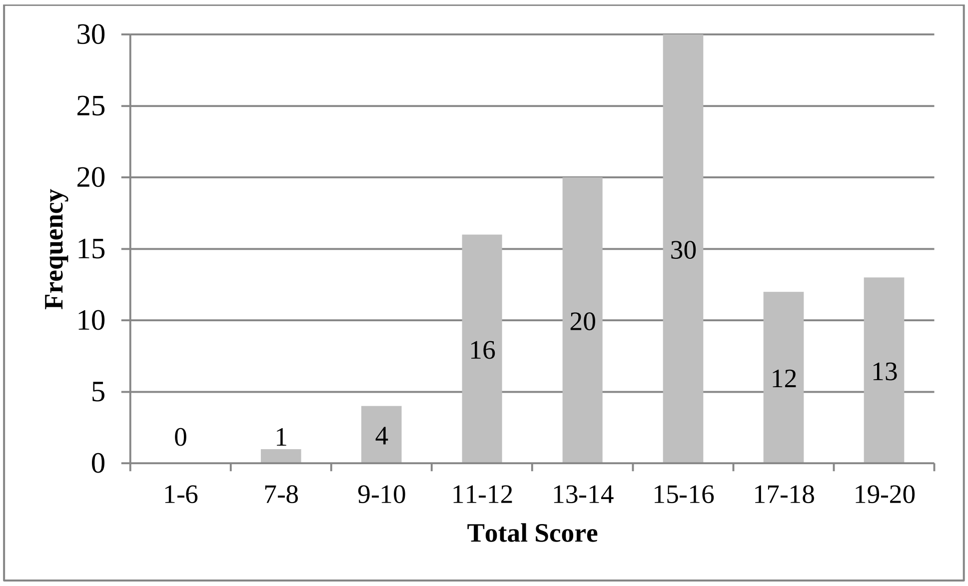

Figure 5. Frequency of part 2 – Foundational concepts total scores

Figure 6 below shows the perception mean scores of all students, by foundational concepts. Once again, the perception mean scores of foundational concepts differed in a positive way from freshman to senior. The highest score difference was between freshman and sophomore with 2.36 points. There was a very slight difference (0.32) between sophomore and junior. Finally, senior students' average total score was 1.13 points higher than junior students.

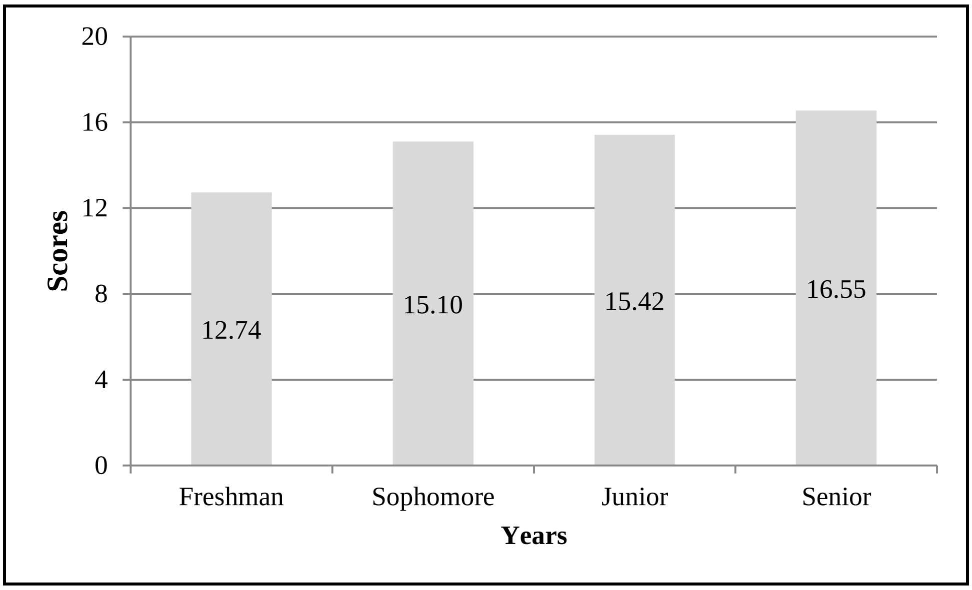

Figure 6. Part 2 – Foundational concepts total mean scores by years

Table 11 provides all participants' results for the four items in Part 2 of the survey.

Table 11
Frequency percentages of part 2 – Foundational concepts items for all participants

Part 2 - Foundational Concepts	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 6 Explain how a computer operates	0	2	27	51	20
Item 7 Identify a computer hardware problem	2	5	39	35	19
Item 8 Identify a computer software problem	2	8	40	38	13
Item 9 Define computer storage	0	4	28	42	26

According to Table 11, 51% of BIM students agreed that they can explain how a computer operates and 42% of them agreed that they can define computer storage. In the 'strongly agree' column, they recorded 20% and 26% for these two items respectively. However, for items 7 and 8, they rated lower in 'agree' and 'strongly agree' columns and preferred to state a 'neutral' position. Therefore, it is obvious that BIM students rated themselves better in items 6 and 9, when compared to items 7 and 8. Anyway, very few of BIM students recorded a low confidence level in foundational concepts.

To examine the foundational concepts level scores of BIM students item wise by years, a summary frequency table was created. Table 12 below provides the students' results for the four items in Part 2 of the survey in accordance with their years.

Table 12
Frequency percentages of part 2 – Foundational concepts items for all participants by years

Part 2 - Foundational Concepts	Years	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 6 Explain how a computer operates	Fr	0	9	52	39	0
	So	0	0	24	55	21
	Ju	0	0	25	58	17
	Se	0	0	5	50	45
Item 7 Identify a computer hardware problem	Fr	9	4	48	39	0
	So	0	7	41	28	24
	Ju	0	8	21	50	21
	Se	0	0	45	25	30
Item 8 Identify a computer software problem	Fr	9	17	48	26	0
	So	0	7	38	45	10
	Ju	0	8	42	33	17
	Se	0	0	30	45	25
Item 9 Define computer storage	Fr	0	9	48	43	0
	So	0	3	31	41	24
	Ju	0	4	21	38	38
	Se	0	0	10	45	45

There was a drastic difference between the percentages of freshman (0%) and sophomore (21%), as well as between junior (17%) and senior students (45%) in the 'strongly agree' column, in Item 6, where the students were asked whether they could explain how a computer operates. While more than half of the freshman students preferred to state a neutral position, sophomore, junior and senior students rated their perception levels higher. 95% of senior students had confidence about that concept.

In identifying hardware problems, while none of the freshman students strongly agreed that they could identify a hardware problem, 24% of sophomore students had strong confidence about that concept. 48% of the freshman and 45% of the senior students preferred to state their opinions as neutral.

Also 9% of the freshmen stated that they were not able to identify a hardware problem, however, there were no sophomore students who strongly disagreed on this item. While freshman (48%), sophomore (41%), and senior (45%) preferred to state their opinions as neutral, only 21% of junior students did so. Moreover, 71% of them either agreed or strongly agreed on that concept.

Only 26% of the freshman agreed that they could identify a software problem. However, sophomore, junior and senior students rated themselves higher. Freshman students' percentages were similar with the previous item's percentages. Senior students had the highest confidence about this concept.

When students were asked if they could define computer storage, half of the freshman students preferred the 'neutral' column, and 43% agreed. On the other hand, more than 65% of sophomore, junior and senior students rated themselves as either capable or highly capable of this concept.

Since the results indicated possible significant differences between students, in addition to descriptive statistics, an analysis of variance test was conducted to determine the possible significant differences between years.

One way ANOVA and Tukey follow up test results for part 2 – Foundational concepts

In order to find out if there was a statistically significant mean difference between foundational concepts perception total mean scores of students from different years, a one way ANOVA, and the follow up test TUKEY were conducted to determine which pairs differed from each other. The results of TUKEY procedure are presented in the summary table below.

Table 13
ANOVA and Tukey test results for part 2 – Foundational concepts

Years	n	Mean	SD	Freshman	Sophomore	Junior	Senior
Freshman	23	12.74	2.240		*	*	*
Sophomore	29	15.10	2.582	*			
Junior	24	15.42	2.636	*			
Senior	20	16.55	2.480	*			

(*) Students' mean scores in different years that is significantly different. ($p < .05$)

As seen in Table 13, foundational concepts mean score of the freshmen (M=12.74, SD=2.24) was significantly lower from all other years ($p< .05$). Therefore, each item in Part 2 – Foundational Concepts was analyzed item wise. The significances for the 5 items of Foundational Concepts are displayed in Table 14.

Table 14
ANOVA and Tukey test results for part 2 – Foundational concepts items

Part 2 Foundational Concepts	Years	Mean	SD	All Students			
				Fr	So	Ju	Se
Item 6 Explain how a computer operates **(Group Mean=3.89)**	Fr	3.30	0.64		*	*	*
	So	3.97	0.68	*			
	Ju	3.92	0.65	*			
	Se	4.40	0.60	*			
Item 7 Identify a computer hardware problem **(Group Mean =3.64)**	Fr	3.17	0.89				
	So	3.69	0.93				
	Ju	3.83	0.87				
	Se	3.85	0.88				
Item 8 Identify a computer software problem **(Group Mean =3.50)**	Fr	2.91	0.90		*	*	*
	So	3.59	0.78	*			
	Ju	3.58	0.88	*			
	Se	3.95	0.76	*			
Item 9 Define computer storage **(Group Mean=3.90)**	Fr	3.35	0.65			*	*
	So	3.86	0.83				
	Ju	4.08	0.88	*			
	Se	4.35	0.67	*			

(*) Students' mean scores in different years that is significantly different. ($p < .05$)

In terms of Foundational Concepts, BIM students had the highest perception mean scores in Item 6 – Explain how a computer operates (M=3.89) and Item 9 – Define computer storage (M=3.90). The lowest perception mean scores for Part 2 were Item 7 – Identify a computer hardware problem (M=3.64) and Item 8 – Identify a computer software problem (M=3.50) respectively.

As seen in Table 14, for Item 7 – Identify a computer hardware problem and Item 9 – Define computer storage, the mean scores increased in years. For Item 6 – Explain how a computer operates and Item 8 – Identify a computer software problem, freshman mean scores were the lowest and senior mean scores were the highest. Sophomore and junior students' mean scores were almost the same.

For Item 6 and Item 8 freshmen's perception mean scores were significantly lower than the sophomore, junior and senior students ($p < .05$). However, there was no significant difference between the mean scores of sophomore, junior and senior students.

For Item 9, freshmen students' perception mean scores were significantly lower than junior and senior students. There was no significant difference between the mean scores of sophomore, junior and senior students.

Due to high standard deviations, the follow up test Tukey did not find any significance for Item 7 between the groups.

Part 3 – Intellectual Capabilities

Descriptive statistics

The maximum score that could be taken from Part 3 – Intellectual Capabilities was 70 points. As displayed in Figure 7 below, the lowest score was 34 points and the highest score was 58 points. The total mean score of intellectual capabilities was 49.55 with a standard deviation of 4.43. The figure displays that 70% of the scores were piled up between 46-53 points.

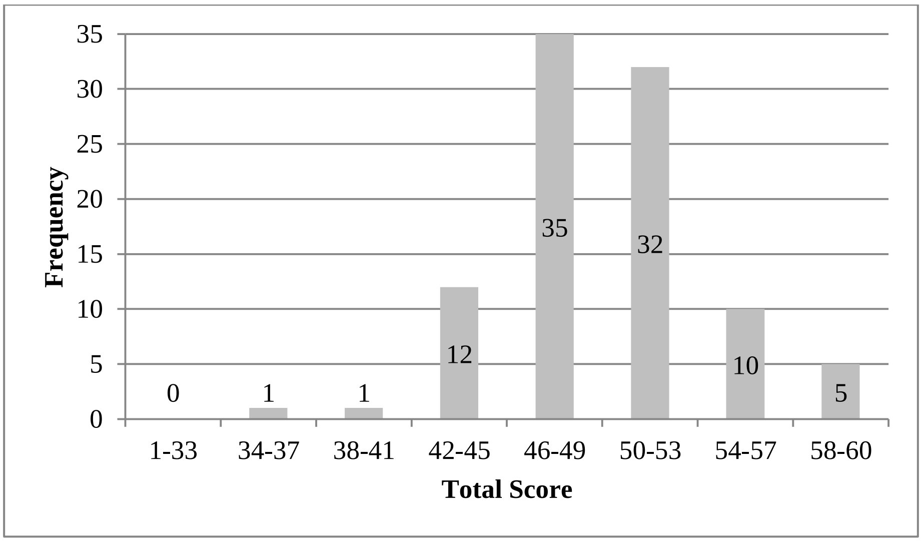

Figure 7. Frequency of part 3 – Intellectual capabilities total scores

Figure 8, below, shows the mean perception scores of all students, by intellectual capabilities. In contrast to Part 1 and Part 2, the perception mean scores of intellectual capabilities were very close. The highest score difference was between freshman and sophomore with 2.36 points. The highest mean score was 50.45 points by sophomore and the lowest mean score was 48.52 by freshman.

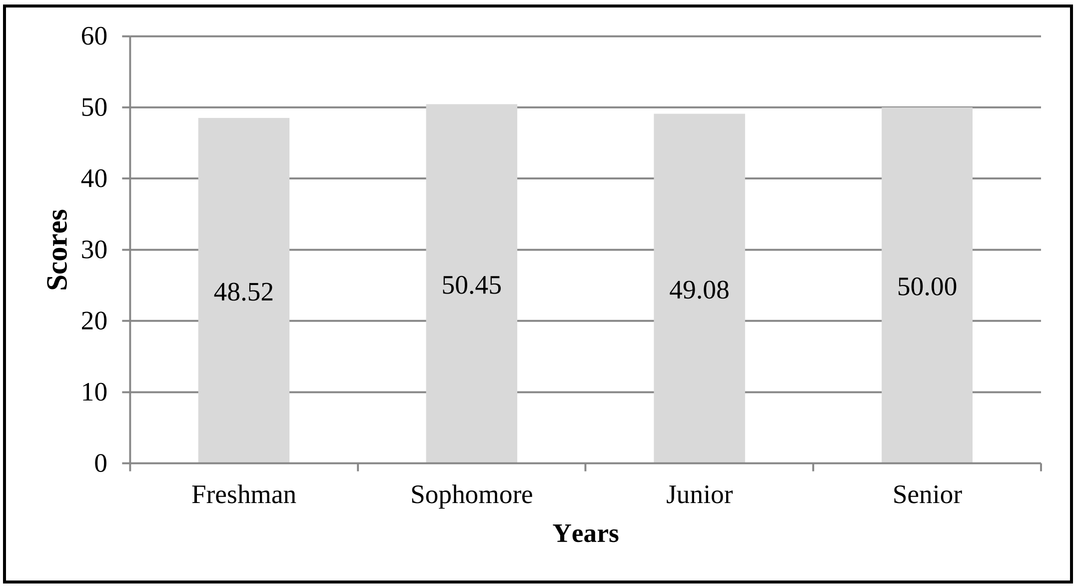

Figure 8. Part 3 – Intellectual capabilities total mean scores by years

Table15 provides all participants' results for the 10th item in Part 3 of the survey.

Table 15
Frequency percentages of item 10 for all participants

Part 3 - Intellectual Capabilities		Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 10. If something went wrong with my computer or a computer I was using, I would likely…	Item 10.a Ignore the problem	1	9	10	42	38
	Item 10.b Troubleshoot the problem myself	1	7	32	40	20
	Item 10.c Find a way to work around the problem	1	2	13	59	25
	Item 10.d Use online support and/or knowledge bases to solve the problem	1	2	13	43	42
	Item 10.e Use printed reference manuals to identify and solve the problem	9	30	30	24	6
	Item 10.f Ask a friend or family member for help	3	11	22	40	24

According to Table 15, when they have a problem with the computer they are using, BIM students mostly prefer either to use online support to solve the problem, or find a way to work around the problem themselves. Interestingly, 80% of the participants also stated that they would ignore the problem. Using printed reference manuals to identify and solve the problem option was preferred the least.

Table 16 provides all participants' results for the 11th and 12th items in Part 3 of the survey.

Table 16
Frequency percentages of items 11 and 12 for all participants

Part 3 - Intellectual Capabilities	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 11 Easily learn new software applications	0	1	17	52	30
Item 12 Feel comfortable & confident when using new technologies	0	4	13	42	42

According to Table 15, BIM students feel comfortable and have confidence in learning new software applications and using new technologies.

Table 17 presents all participants' results for the 13th item in Part 3 of the survey.

Table 17.
Frequency percentages of item 13 for all participants

Part 3 - Intellectual Capabilities		Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 13 When I want to use a new function or feature in a software application, I would likely…	Item 13.a Use the application help screens	5	21	34	34	5
	Item 13.b Read the manual	5	27	30	33	4
	Item 13.c Call a help desk	9	40	28	23	0
	Item 13.d Ask a friend or family member for help	3	14	20	48	16
	Item 13.e Access online resources	1	1	6	60	31
	Item 13.f Figure out myself	0	2	25	38	35

As seen in Table 17, BIM students recorded the highest scores in Item 13.e. 91% of BIM students prefer to access online resources for learning how to use a new function or feature in an application. While 73% of them preferred to figure out this process themselves, 64% of them stated that they would ask a friend or family member for help. Calling a help desk (23%) was preferred the least by the participants.

To examine the intellectual capabilities level scores of BIM students item wise by years, a summary frequency table was created. Table 18 provides the students' results for Item 10 of the survey in accordance with their years.

Table 18
Frequency percentages of item 10 for all participants by years

Part 3 - Intellectual Capabilities		Years	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 10. If something went wrong with my computer or a computer I was using, I would likely…	Item 10. a Ignore the problem	Fr	0	17	13	39	30
		So	0	10	10	38	41
		Ju	4	8	8	42	38
		Se	0	0	10	50	40
	Item 10. b Troubleshoot the problem	Fr	4	4	39	43	9
		So	0	10	31	34	24
		Ju	0	4	33	38	25
		Se	0	10	25	45	20
	Item 10. c Find a way to work around the problem	Fr	0	9	13	61	17
		So	3	0	14	66	17
		Ju	0	0	13	54	33
		Se	0	0	10	55	35
	Item 10. d Use online support and/or knowledge bases to solve the problem	Fr	0	4	13	48	35
		So	0	0	10	48	41
		Ju	0	4	17	33	46
		Se	5	0	10	40	45
	Item 10. e Use printed reference	Fr	9	26	35	30	0
		So	0	41	28	17	14
		Ju	25	25	29	17	4
		Se	5	25	30	35	5
	Item 10. f Ask a friend or family member	Fr	0	22	17	57	4
		So	3	7	21	34	34
		Ju	8	8	17	33	33
		Se	0	10	35	35	20

While reporting the results in Table 17, it was already stated that BIM students mostly preferred to use online support or troubleshoot the problem themselves when they have a hardware problem. A closer look at the data indicated that, the differences between years were not as remarkable as they were in the previous items. However, it is noteworthy to point out the positive difference of other years from freshman students in ‘Troubleshoot the problem’ and in ‘Ask a friend or family member’ options.

Table 19 presents the students’ results for Items 11 and 12 of the survey in accordance with their years.

Table 19
Frequency percentages of items 11 and 12 for all participants by years

Part 3 - Intellectual Capabilities	Years	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 11 Easily learn new software applications	Fr	0	4	30	52	13
	So	0	0	14	52	34
	Ju	0	0	8	54	38
	Se	0	0	15	50	35
Item 12 Feel comfortable and confident when using new technologies	Fr	0	0	22	43	35
	So	0	7	10	45	38
	Ju	0	4	13	33	50
	Se	0	5	5	45	45

While 30% of the freshman preferred to select neutral option in Item 11, only 13% of the freshmen strongly agreed that they easily learn new software applications. However, more than one third of sophomore, junior and senior students, strongly agreed that they could easily learn new software applications.

As seen in Table 19, the frequency percentages are similar for item 12. Students of all years claimed that, they could easily learn new software applications and felt comfortable and confident when using new technologies.

Table 20 presents the students' results for Item 13 in accordance with their years.

Table 20
Frequency percentages of Item 13 for all participants by years

Part 3 - Intellectual Capabilities		Years	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Item 13. When I want to use a new function or feature in a software application, I would likely…	Item 13. a Use the application help screens	Fr	4	17	30	48	0
		So	10	21	31	31	7
		Ju	4	21	42	29	4
		Se	0	25	35	30	10
	Item 13. b Read the user manual	Fr	4	26	26	39	4
		So	3	24	34	31	7
		Ju	13	25	33	29	0
		Se	0	35	25	35	5
	Item 13. c Call a help desk attendee	Fr	9	39	26	26	0
		So	3	21	38	38	0
		Ju	17	42	21	21	0
		Se	10	65	25	0	0
	Item 13. d Ask a friend or family member	Fr	0	22	22	48	9
		So	3	3	24	45	24
		Ju	8	13	21	38	21
		Se	0	20	10	65	5
	Item 13. e Access online resources	Fr	0	0	13	61	26
		So	0	0	3	59	38
		Ju	4	4	4	63	25
		Se	0	0	5	60	35
	Item 13. f Figure it out myself	Fr	0	0	30	48	22
		So	0	0	38	38	24
		Ju	0	4	17	38	42
		Se	0	5	10	25	60

According to Table 20, BIM students of all years, definitely preferred to access online resources when they want to use a new function or feature in a software application. They also highly rated the 'figure it out myself' option. Almost 60% of students from freshman to senior also stated that, they would ask a friend or family member for help. Using the application help screens and reading the user manual options were not rated as high as the previous options. However, BIM students, especially the senior students, absolutely did not prefer to call a help desk attendee.

Senior students rated "ask a friend or family member" option higher than "access online resources option". Instead of wasting time while accessing the online resources, they prefer to solve their problem faster by asking for assistance.

Since the results indicated possible significant differences between students, in addition to descriptive statistics, an analysis of variance test was conducted to determine the possible significant differences between years.

One way ANOVA and Tukey follow up test results for part 3 – Intellectual capabilities

To examine the intellectual capabilities perception levels of BIM students and in order to find out if there was a statistically significant mean difference between intellectual capabilities perception total mean scores of students from different years, an ANOVA was conducted. Table 21 shows the results of the analysis.

Table 21
ANOVA and Tukey test results for part 3 – Intellectual capabilities

Years	n	Mean	SD	Freshman	Sophomore	Junior	Senior
Freshman	23	48.52	3.871				
Sophomore	29	50.45	4.272				
Junior	24	49.08	5.274				
Senior	20	50.00	4.167				

(*) Students' mean scores in different years that is significantly different. ($p < .05$)

As seen in Table 21, the mean scores did not significantly differ ($p< .05$). Nevertheless, since the frequency tables indicated possible significant differences between years, each item in Part 3– Intellectual Capabilities was analyzed item wise.

As seen in Table 22, for Item 10, there were no significant differences between groups.

Table 22
ANOVA and Tukey test results for part 3 – Item 10

Part 3 Intellectual Capabilities		Years	Mean	SD	All Students Fr	So	Ju	Se
Item 10. If something went wrong with my computer or a computer I was using, I would likely…	Item 10. a Ignore the problem (Group Mean =4.05)	Fr	3.83	1.072				
		So	4.10	0.976				
		Ju	4.00	1.103				
		Se	4.30	0.657				
	Item 10. b Troubleshoot the problem (Group Mean=3.70)	Fr	3.48	0.898				
		So	3.72	0.96				
		Ju	3.83	0.868				
		Se	3.75	0.91				
	Item 10. c Find a way to work around the problem (Group Mean =4.05)	Fr	3.87	0.815				
		So	3.93	0.799				
		Ju	4.21	0.658				
		Se	4.25	0.639				
	Item 10. d Use online support and/or knowledge bases to solve the problem (Group Mean=4.22)	Fr	4.13	0.815				
		So	4.31	0.66				
		Ju	4.21	0.884				
		Se	4.20	1.005				
	Item 10. e Use printed reference (Group Mean =2.88)	Fr	2.87	0.968				
		So	3.03	1.085				
		Ju	2.50	1.18				
		Se	3.10	1.021				
	Item 10. f Ask a friend or family member (Group Mean=3.70)	Fr	3.43	0.896				
		So	3.90	1.081				
		Ju	3.75	1.26				
		Se	3.65	0.933				

(*) Students' mean scores in different years that is significantly different. ($p < .05$)

Table 23 below, displays the descriptive data and the significances for the Items 11 and 12.

Table 23
ANOVA and Tukey test results for part 3 – Items 11 and 12

Part 3 Intellectual Capabilities	Years	Mean	SD	All Students			
				Fr	So	Ju	Se
Item 11 Easily learn new software applications (Group Mean=4.11)	Fr	3.74	0.752			*	
	So	4.21	0.675				
	Ju	4.29	0.624	*			
	Se	4.20	0.696				
Item 12 Feel comfortable and confident when using new technologies (Group Mean =4.21)	Fr	4.13	0.757				
	So	4.14	0.875				
	Ju	4.29	0.859				
	Se	4.30	0.801				

(*) Students' mean scores in different years that is significantly different. (p < .05)

For Item 11- Easily learn new software applications, freshmen's perception mean scores were significantly lower than the junior students (p<.05). There was no significant difference between the mean scores of sophomore and senior students.

For Item 12 – Feel comfortable and confident when using new Technologies, there was no significant difference between BIM students. The mean score for all students was 4.21 points, which was remarkably high.

Lastly, the significances for Item 13 are displayed in Table 24, which was about actions taken, when a new function or feature was to be learned.

Table 24
ANOVA and Tukey test results for part 3 – Item 13

Part 3 Intellectual Capabilities		Years	Mean	SD	All Students			
					Fr	So	Ju	Se
Item 13. When I want to use a new function or feature in a software application, I would likely…	Item 13. a Use the application help screens (Group Mean =3.14)	Fr	3.22	0.902				
		So	3.03	1.117				
		Ju	3.08	0.929				
		Se	3.25	0.967				
	Item 13. b Read the user manual (Group Mean =3.04)	Fr	3.13	1.014				
		So	3.14	0.99				
		Ju	2.79	1.021				
		Se	3.10	0.968				
	Item 13. c Call a help desk attendee (Group Mean =2.65)	Fr	2.70	0.974				
		So	3.10	0.860			*	*
		Ju	2.46	1.021		*		
		Se	2.15	0.587		*		
	Item 13. d Ask a friend or family member (Group Mean =3.59)	Fr	3.43	0.945				
		So	3.83	0.966				
		Ju	3.50	1.216				
		Se	3.55	0.887				
	Item 13. e Access online resources (Group Mean =4.20)	Fr	4.13	0.626				
		So	4.34	0.553				
		Ju	4.00	0.933				
		Se	4.30	0.571				
	Item 13. f Figure it out myself (Group Mean =4.06)	Fr	3.91	0.733				
		So	3.86	0.789				
		Ju	4.17	0.868				
		Se	4.40	0.883				

(*) Students' mean scores in different years that is significantly different. ($p < .05$)

As seen in Table 24, there was no significant difference between BIM students in Item 13, except Item 13.c. For Item 13.c – 'When I want to use a new function in a software application, I would likely call a help desk attendee', sophomore students' perception mean scores were significantly higher than the junior and senior students ($p< .05$). When the mean scores of the sub items of Item 13 were sorted in a descending order, it was seen that, while learning a new function or feature, BIM students prefer to access online resources (Item 13.e, M=4.20). Then comes 13.f –

Figure out myself (M=4.06), 13.d – Ask a friend or family member (M=4.06), 13.a – Use the application help screens (M=3.14) , 13.b – Read the user manual respectively. When they want to learn a new function or feature in a software application, their last alternative is 13.c – Call a help desk attendee (M=2.65).

The results of the research question 2

The second research question of the current study was "Is there a difference between female and male Business Information Management students' perceived FITness level scores?" The sub question was "What might be the reasons for the possible differences between male and female Business Information Management students' perceived fitness level scores?"

To analyze the second research question, initially descriptive statistics was used. The percentages of male and female BIM Students' responses were reported by using frequency and mean score graphs. Secondly, an independent samples t-test was conducted to compare the Perception Survey total mean scores of male and female students.

This research study was conducted by 66 male and 30 female students. The maximum total score of the Fluency in Information Technology Perception Survey (Sharp, 2010) was 110 points. Among 66 male participants, the lowest score was 59 points and the highest score was 95 points, whereas among 30 female participants, the lowest score was 62 points and the highest score was 90 points. Figure 9 displays the frequency percentages of the total scores by gender.

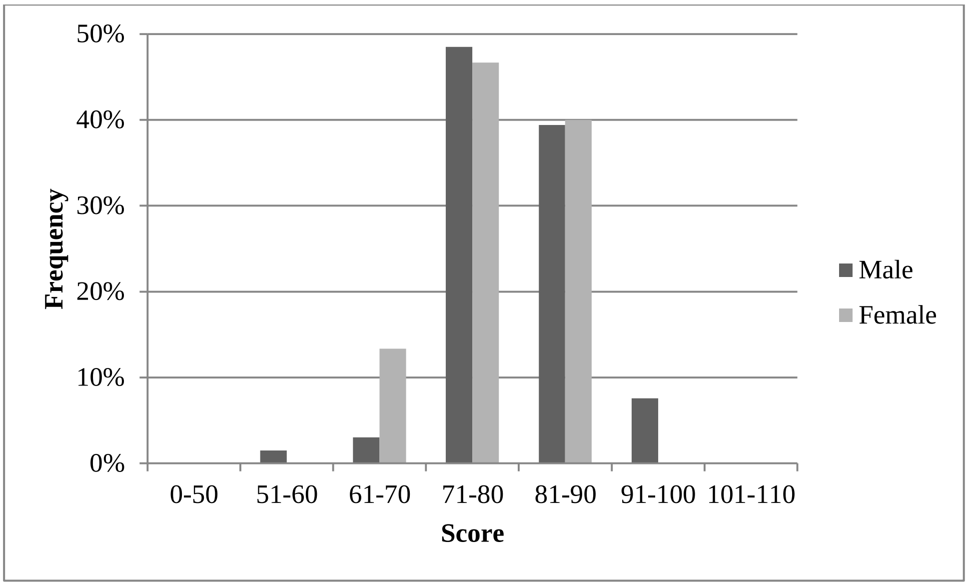

Figure 9. Frequency percentages of total scores by gender

As seen in Figure 9, almost 50% of the male and female students' scores were piled up between 71-80 points, and 40% of the scores were piled up between 81-90 points.

Figure 10 displays the total perception mean scores of both genders.

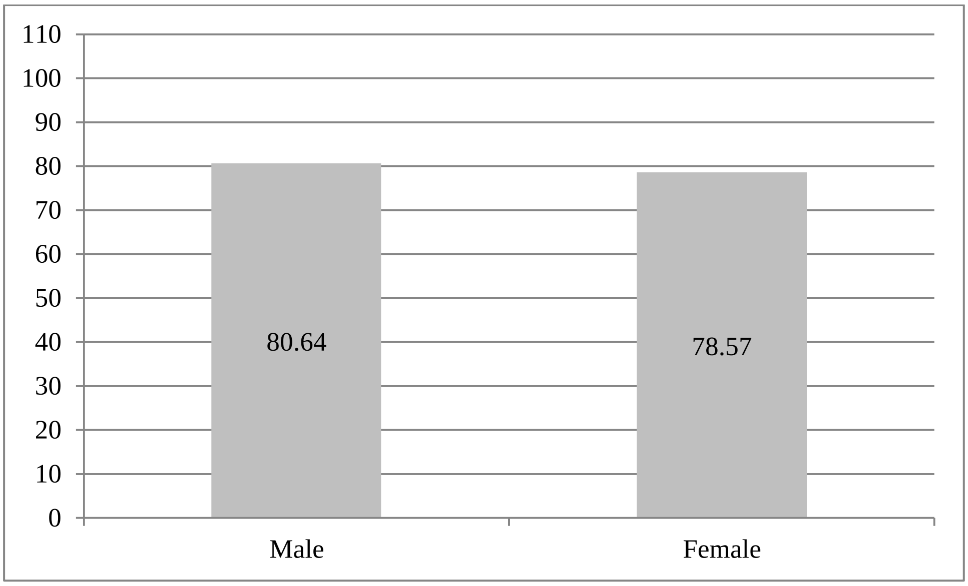

Figure 10. Fluency in IT perception survey total mean scores by gender

As seen in Figure 10, total perception mean score of male participants was 80.64 with a standard deviation of 6.88 and the total perception mean score of female students was 78.57 points with a standard deviation of 7.07 points.

Independent samples t-test results

To examine the Fluency in Information Technology Perception levels of male and female BIM students and in order to find out if there was a statistically significant mean difference between FITness perception total mean scores of male and female students, an independent samples t-test was conducted. Table 25 shows the results of the analysis.

Table 25
Fluency in IT perception survey total scores

Gender	n	Mean	SD	Significance
Male	66	80.64	6.88	0.179
Female	30	78.57	7.07	

As seen in Table 25, there was no significant difference between the mean score of male students (M=80.64, SD=6.88) and female students (M=78.57, SD=7.07).

Although there was no statistically significant difference between male and female students, in the light of the results of the analysis of variance conducted for the first research question, as well as the literature, an independent samples test for each part of the survey was conducted.

As mentioned before, Fluency in Information Technology Perception Survey (Sharp, 2010) had 3 parts, Part 1 – Contemporary Skills, Part 2 – Foundational Concepts, and Part 3 – Intellectual Capabilities.

In the following section, the total mean scores for each part and item wise mean scores were analyzed.

Part 1 – Contemporary Skills

Figure 11, below, shows the mean perception scores of female and male students, by contemporary skills. The maximum score that could be taken from Part 1 – Contemporary Skills was 20 points. As seen, male students' mean score was 1.15 points higher than the female students.

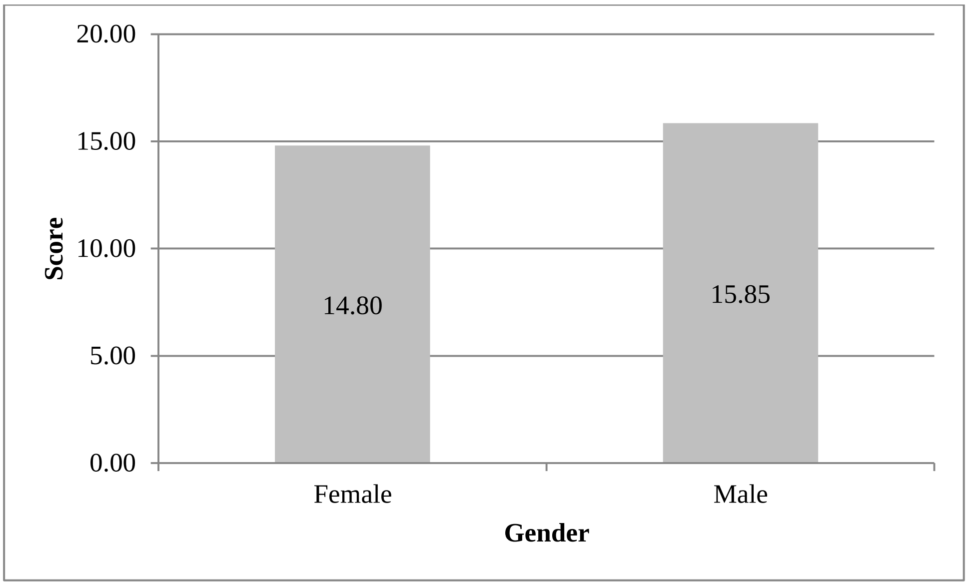

Figure 11. Part 1 – Contemporary skills total mean scores by gender

To examine the contemporary skills perception levels of male and female BIM students and in order to find out if there was a statistically significant mean difference between contemporary skills perception total mean scores of male and female students, an independent samples t-test was conducted. Table 26 shows the results of the analysis.

Table 26
Independent samples t-test results for Part 1 – Contemporary skills

Gender	N	Mean	SD	Significance
Male	66	15.85	2.52	0.068
Female	30	14.80	2.70	

(*) Male and female students' mean scores that is significantly different. ($p < .05$)

As seen in Table 26, there was no significant difference between the mean score of male students (M=15.85, SD=2.52) and female students (M=14.80, SD=2.70). Nevertheless, each item in Part 1 – Contemporary Skills was analyzed item wise. The descriptive data and the significances for the 5 items of Contemporary Skills are displayed in Table 27.

Table 27
Independent samples t-test results for Part 1 – Contemporary skills items

Part 1 Contemporary Skills	Gender	Mean	SD	Significance
Item 1 Using operating system features	M	3.26	0.62	**0.045***
	F	2.97	0.72	
Item 2 Using word processors	M	3.47	0.64	0.141
	F	3.27	0.58	
Item 3 Using presentation applications	M	3.06	0.70	0.173
	F	3.27	0.64	
Item 4 Using spreadsheets	M	2.94	0.82	0.092
	F	2.63	0.81	
Item 5 Using instructional materials	M	3.12	0.69	**0.005***
	F	2.67	0.76	

(*) Male and female students' mean scores, that is significantly different. ($p < .05$)

In terms of Contemporary Skills, both male and female BIM students had their highest perception mean score in Item 2 - Using Word processors. Both genders had their lowest perception mean score and the highest standard deviation in Item 4 – Using Spreadsheets. For Item 1 – Using Operating System Features, and Item 5 – Using Instructional Materials, male students' mean scores were significantly higher than the female students ($p<.05$). However, there was no statistically significant difference between two genders for Items 2, 3 and 4. In all items of Part 1 – Contemporary Skills, male students' mean scores were higher than female students.

Part 2 – Foundational Concepts

Figure 12 shows the mean perception scores of female and male students, by foundational concepts. The maximum score that could be taken from Part 2 – Foundational Skills was 20 points. As seen, male students' mean score was 1.87 points higher than the female students.

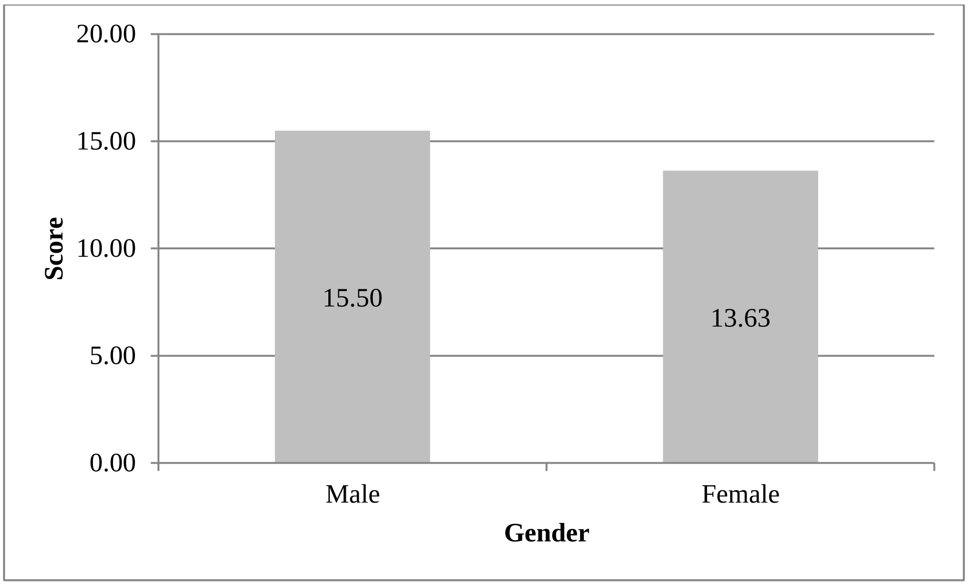

Figure 12. Part 2 – Foundational concepts total mean scores by gender

To examine the foundational concepts perception levels of female and male BIM students and in order to find out if there was a statistically significant mean difference between foundational concepts perception total mean scores of female and male students, an independent samples t-test was conducted. Table 28 shows the results of the analysis.

Table 28
Independent samples t-test results for part 2 – Foundational concepts

Gender	n	Mean	SD	Significance
Male	66	15.50	2.83	**0.002***
Female	30	13.63	2.28	

(*) Male and female students' mean scores that is significantly different. ($p < .05$)

As seen in Table 28, male students' foundational skills perception mean scores (M=15.50, SD= 2.83) were significantly higher than female students (M=13.63, SD=2.28) (p< .05). Therefore, each item in Part 2– Foundational Concepts was analyzed item wise.

The descriptive data and the significances for the four items of Part 2 - Foundational Concepts are displayed in Table 29.

Table 29
Independent samples t-test results for part 2 – Foundational concepts items

Part 2 Foundational Concepts	Gender	Mean	SD	Significance
Item 6 Explain how a computer operates	M	4.02	0.71	**0.01***
	F	3.60	0.72	
Item 7 Identify a computer hardware problem	M	3.74	0.97	0.091
	F	3.40	0.77	
Item 8 Identify a computer software problem	M	3.65	0.92	**0.013***
	F	3.17	0.75	
Item 9 Define computer storage	M	4.09	0.78	**0.001***
	F	3.47	0.82	

(*) Male and female students' mean scores, that is significantly different. (p < .05)

Male students' mean scores were significantly higher than the female students (p< .05) for items 6, 8 and 9. However, there was no statistically significant difference between two genders for Item 7. In terms of Foundational Concepts, male students had their highest perception mean score in Item 9 – Define Computer Storage (M=4.09, SD=0.78), whereas female students had their highest perception mean score in Item 6 – Explain how a computer operates (M=3.60, SD=0.72). Both male and female students had their lowest perception mean score in Item 8 – Identify a computer software problem (Male: M=3.65, SD=0.92, Female: M=3.17, SD=0.75).

Part 3 – Intellectual Capabilities

Figure 13 below, shows the mean perception scores of female and male students, by intellectual capabilities. The maximum score that could be taken from Part 3 – Intellectual Capabilities was 70 points. As seen, male students' mean score was only 0.84 points higher than the female students.

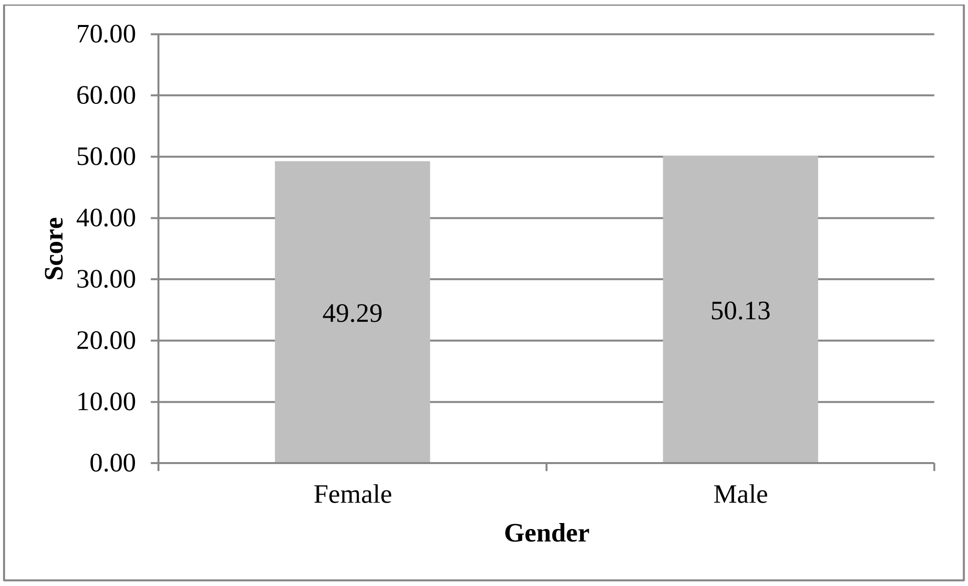

Figure 13. Part 3 – Intellectual capabilities total mean scores by gender

To examine the intellectual capabilities perception levels of male and female BIM students and in order to find out if there was a statistically significant difference between intellectual capabilities perception total mean scores of female and male students, an independent samples t-test was conducted. Table 30 shows the results of the analysis.

Table 30
Independent samples t-test results for part 3 – Intellectual capabilities

Gender	n	Mean	SD	Significance
Male	66	49.29	4.44	0.389
Female	30	50.13	4.43	

(*) Male and female students' mean scores that is significantly different. ($p < .05$)

As seen in Table 30, there was no significant difference between male students' intellectual capabilities perception mean scores (M=49.29, SD= 4.44) and female students' perception mean scores (M=50.13, SD=4.43). Nevertheless, each item in Part 3– Intellectual Capabilities was analyzed item wise. The significances for the sub questions of Item 10 are displayed in Table 31.

Table 31
Independent samples t-test results for part 3 – Item 10

Part 3 Intellectual Capabilities		Gender	Mean	SD	Significance
Item 10. If something went wrong with my computer or a computer I was using, I would likely…	Item 10. a Ignore the problem	M	4.17	0.97	0.088
		F	3.80	0.96	
	Item 10. b Troubleshoot the problem	M	3.91	0.84	**0.001***
		F	3.23	0.90	
	Item 10. c Find a way to work around the problem	M	4.09	0.76	0.452
		F	3.97	0.72	
	Item 10. d Use online support and/or knowledge bases to solve the problem	M	4.29	0.78	0.224
		F	4.07	0.91	
	Item 10. e Use printed reference	M	2.83	1.08	0.577
		F	2.97	1.10	
	Item 10. f Ask a friend or family member	M	3.48	1.06	**0.003***
		F	4.17	0.91	

(*) Male and female students' mean scores, that is significantly different. ($p < .05$)

In terms of Item 10, male students had their highest perception mean score in Item 10.d – Use online support and/or knowledge bases to solve a problem, whereas, female students had their highest perception mean score in Item 10.f – Ask a friend or family member when they have a hardware problem. Both male and female students had their lowest perception mean score in Item 10.e – Use printed reference when they have a hardware problem.

For Item 10.b – Troubleshoot the problem, male students' mean scores were significantly higher than the female students (p<.05). For the first time in the current study, for Item 10.f – Ask a friend or family member when they have a hardware problem, female students' mean scores were significantly higher than male students. However, there was no statistically significant difference between two genders for Item 10.a – Ignore the problem, 10.c – Find a way to work around the problem, 10.d – Use online support and/or knowledge bases to solve the problem and 10.e – Use printed reference. Except Item 10.e and 10.f, male students' mean scores were higher than female students for Item 10 sub questions.

The t-test results and the significances for the Items 11 and 12 are displayed in Table 32.

Table 32
Independent samples t-test results for part 3 – Items 11 and 12

Part 3 Intellectual Capabilities	Gender	Mean	SD	Significance
Item 11 Easily learn new software applications	M	4.23	0.65	**0.020***
	F	3.87	0.78	
Item 12 Feel comfortable and confident when using new technologies	M	4.38	0.74	**0.002***
	F	3.83	0.87	

(*) Male and female students' mean scores, that is significantly different. (p < .05)

As seen in Table 32, for Item 11 - Easily learn new software applications and Item 12 – Feel comfortable and confident when using new technologies, male students' mean scores were significantly higher than female students (p< .05).

The t-test results and the significances for Item 13 are displayed in Table 33.

Table 33
Independent samples t-test results for part 3 –Item 13

Part 3 Intellectual Capabilities		Gender	Mean	SD	Significance
Item 13. When I want to use a new function or feature in a software application, I would likely…	Item 13. a Use the application help screens	M	2.94	1.01	**0.003***
		F	3.57	0.77	
	Item 13. b Read the user manual	M	2.92	0.97	0.086
		F	3.30	1.02	
	Item 13. c Call a help desk attendee	M	2.56	0.99	0.189
		F	2.83	0.79	
	Item 13. d Ask a friend or family member	M	3.44	1.08	**0.026***
		F	3.93	0.74	
	Item 13. e Access online resources	M	4.21	0.71	0.767
		F	4.17	0.65	
	Item 13. f Figure it out myself	M	4.08	0.85	0.818
		F	4.03	0.81	

(*) Male and female students' mean scores, that is significantly different. ($p < .05$)

In terms of Item 13, both male and female students had their highest perception mean scores in Item 13.e – Access online resources to use a new function/feature in a software application whereas both genders had their lowest perception mean score in Item 13.c – Call a help desk attendee to use a new function/feature in a software application. Contrary to most of the Part 1 and Part 2 items, female students' mean scores were higher than male students, except Item 13.e and Item 13.f. However, those mean score differences were not statistically significant.

For Item 13.a – Use the application help screens, and Item 13.d – Ask a friend or family member, female students' mean score was significantly higher than male students ($p<.05$).

CHAPTER 5: DISCUSSION

Introduction

This chapter provides detailed information about the major findings of this study. Firstly, an overview of the study is provided. Secondly, major findings are discussed under three titles: Contemporary skills, Foundational concepts and Intellectual capabilities. Then, implications for further research and practice and limitations of the study are provided. The chapter ends with the conclusion of the study.

Overview of the study

This research study intended to describe the Ihsan Doğramacı Bilkent University Business Information Management (BIM) department students' own perception of their Fluency in Information Technology (FITness) level, as they progress the 4-year program and to seek explanations for the students' perceived FITness.

The following research questions were identified:

Main question 1:

Is there any progress in FITness scores of Business Information Management students, as they progress through the 4-year program?

Sub question:

Is there any significant difference between Business Information Management students' perceived FITness level mean scores in terms of years? If so, is it in favor of senior?"

Main question 2:

Is there a difference between female and male Business Information Management students' perceived FITness level scores?

Data were collected from 96 students from all years. "Perceptual Information Technology Fluency Skills Survey (Sharp, 2010) was used to collect the data.

In order to answer the first research question and its sub-question, a one-way analysis of variance (ANOVA) was conducted. For the significant results, Tukey follow-up test ($p<.05$) was used. For answering the second research question, independent samples t-test was conducted.

For discussing the results of the analyses, a meeting was held by two experts, i.e., the chair and the assistant chair of Business Information Management Department. Both of the experts have extensive experience in Information Technology courses offered in the department. In addition to that, they know the BIM Department student profile well, since they have been working as administrators and instructors in the department for more than 20 years. The Curriculum Vitae's of the experts can be found in Appendix 3 and Appendix 4.

In this chapter, the results obtained from the data analysis will be discussed critically in the light of the related literature. The results will be discussed under 6 sub headings.

In addition to that, this chapter will provide information about the future implications of the research study and its limitations.

Major findings

In the analysis of the first research question, the results of the frequency tables, as well as one way ANOVA and the follow up test Tukey, revealed that Fluency in Information Technology perception level scores of the Business Information Management students increased by years. These results were not compatible with Kaminski et al.'s (2009), Johnson et al.'s and Verhoeven et al.'s (2012) findings. According to Johnson et al. (2006) and Kaminski et al.'s research results (2009), there was an overall decline in perceived FITness level over years. The results of Verhoeven et al.'s (2012) study revealed that, the self-perceived IT skills of students did not increase much between freshman and sophomore. One possible explanation for the decline, stated by the researchers, was that the university did not offer any opportunities to work with the related applications. Another possible explanation was that, senior students were more aware of the fact that they did not have sufficient knowledge and skills in these categories. Therefore, the increase in the perceived IT skills of BIM students indicates the positive effect of integrating IT skills into other courses throughout the 4-year program.

Freshman BIM students had definitely lower scores which reflect their lack of confidence in contemporary skills and foundational concepts. However, in terms of intellectual capabilities, freshmen rated themselves similar with other years. Therefore, the gap between the freshman and other years was caused by the differences in their perceived contemporary skills and their perceived knowledge level in foundational concepts.

Contrary to other research in the literature (Shashaani, 1997; Cooper, 2006), in the analysis of the second research question, the current study's results revealed no significant difference between the perception survey total scores of male and female BIM students. Therefore, it was an interesting finding that, male and female BIM students' mean scores were almost the same, where in other studies (McEuen, 2001; Seyrek, 2010) the majority of male students saw themselves as having a higher IT fluency than do the female students. However, when the item wise analyses were made, significant differences were found in some items.

In line with the literature, BIM male students have more confidence in technical aspects such as using operating system features and instructional materials, defining computer operations and computer storage, troubleshooting the problem when a hardware problem occurs. However, in terms of application using skills and intellectual capabilities, male and female BIM students' FITness levels were similar.

In the following sections, the results of the first and second research questions will be discussed in terms of the three parts of the survey.

Contemporary skills

The increase in the FITness perception level mean scores, especially the gap between freshman and sophomore, speculatively indicated that, the IT courses offered in the department have positive effects on the students' FITness perception levels. Part 1 – Contemporary Skills of the Perceptual IT Fluency Skills Survey included the most relevant items to the subjects taught in Business Computer Applications I and II courses, which are offered during the second and third semesters of BIM curriculum (See Appendix 2).

Therefore, the statistically significant difference between freshman and other years seems to depend on these courses.

As mentioned before, BIM students also take other IT courses, such as Database Management Systems, Web Site Development, Web Based Application Development and so on, in their second, third and fourth years (Appendix 2). However, the results revealed no significant differences between the mean scores of sophomore, junior and senior students, in terms of their contemporary skills. In the follow-up interview with experts, the department chair stated, this was possibly due to the fact that, there were not any items related to using a database system, or creating web pages.

In terms of contemporary skills, freshman BIM students rated themselves significantly less confident than other years.

The increase in mean scores, whereas the decrease in standard deviations by years were good indicators of increasing self-confidence of students through the 4-year program (See Table 10).

As mentioned before, Business Information Management is an applied department. The department courses are designed in a way combining the theoretical knowledge with practice. In addition to that, knowledge or skill learned in a course constitutes a basis for several other courses. For example, in Business Computer Applications II course, students are taught advanced spreadsheet skills. Later on, in Financial Management and Managerial Accounting courses, the students continue using their spreadsheet skills. Throughout the 4-year program, almost in every course, they continue using their word processors skills either for doing homework or writing project reports. word processors are the most frequently used applications by all students during the 4-year program. Especially in communication related courses, they enrich their presentations with audio-video aids using their presentation application skills. During the industrial training, they have to adapt their contemporary skills into business life. Therefore, the improvement of BIM students' perceived contemporary skills in years is expectable.

The item wise findings for contemporary skills revealed that all BIM students were the most confident in using word processors. Although, freshman and sophomore students' perceptions were significantly lower than senior students, both the frequency tables and the statistical test results revealed that, they came to the university already knowing word processors. Therefore, the relatively high confidence level scores in using word processors seems to be plausible.

After word processors, using operating system features and presentation applications were rated as the second best contemporary skills of BIM students. These skills are taught in Business Computer Applications I course, which is offered by the Assistant Chair of BIM Department. According to the results, BIM students of all years rated themselves as moderately confident in using operating system features and presentation applications. However, where only 4% of freshmen perceived themselves as experts in using basic operating system features, the percentages for sophomore, junior and senior students were 34%, 42% and 40% respectively (see Table 8). These results, once more, revealed a possible positive effect of the IT courses offered in the department of Business Information Management.

There was no significant difference between male and female students' perceived contemporary skills total mean scores. However, item wise analyses found statistically significant results in using operating system features and using instructional materials.

In terms of genders, female students rated themselves significantly less confident than male students in using operating system features. These results were in line with the literature. According to Shashaani (1997), males were more interested in computers than females and enjoy working with them more. Another quantitative study revealed that boys were rather interested in hardware and programming, while girls rather prefer standard software and Internet applications (BECTA, 2008). In the follow-up interview with experts, the Assistant Department Chair declared that, most of the female students were reluctant to learn operating system features, and claimed that those features were confusing for them to learn. As stated in BECTA (2008), the differences that exist between boys and girls may be due to boys spending more time playing computer games and therefore, spending more time with the operating system. Anyway, it is noteworthy that, in a study conducted by Madigan et al. (2007), male students perceived themselves to be significantly more proficient when surveyed, but the practical assessments demonstrated no difference from the female students.

BIM students were least confident in using spreadsheets. However, again freshman students rated themselves significantly less confident than other years. BIM students learn advanced use of spreadsheets in Business Computer Applications II course, which is offered by the researcher, herself. Although the difference between freshman and other years revealed the positive effects of this course, the low mean scores could be attributed to the complexity of spreadsheets. To grow confidence in 'using spreadsheets' is not as easy as other applications, such as word processors or presentation applications, especially for students who are not into numbers, calculation, formulas, graphs and so on. In addition to creating basic formatted tables, there are many other features of spreadsheets such as, using mathematical, logical, statistical and financial functions, data validation, creating pivot tables, creating macros, creating charts. Anyway, the increase in mean scores versus the decrease in standard deviations revealed that, their confidence increased in using spreadsheets and they became a more homogenious group through the 4-year program. Even though it was small, there was a 13% negative difference between junior and senior students in terms of having expert knowledge.

During the meeting held with two experts, a possible explanation for that case was discussed. As mentioned before, there are two internship programs in the four-year BIM curriculum (see Appendix 2). Before struggling to adjust in business life, the summer internship (after the completion of 2nd year) and especially the semester internship (second semester of the 3rd year) programs bridge the gap between industrial practices and theoretical education. Therefore, before the semester internship, students have higher confidence in their spreadsheet skills, however after experiencing the complex uses of spreadsheets in the real life, they realize that they are not as good as they perceived.

In terms of spreadsheets, on the contrary to significant differences between years, no significant difference was found between male and female students. This seems to be another indicator towards the reliability of the data collected in this study. As mentioned above, in order to rate oneself high in the domain of "spreadsheets", one has to have formal knowledge. Knowing the fact that male students have a tendency to overestimate their information technology skills (Lee, 2003; Ballantine, 2007; Madigan, 2007; Nash, 2009), these results are possibly an indicator of expressing the students' real perceptions about their spreadsheet skills without overestimation.

The last item of Part 1, 'Using Instructional Materials' was rated as moderately low by BIM students. While 50% of senior students believed that they have expert knowledge, 13% of freshman and 14% sophomore students rated themselves as experts. Female students rated themselves significantly less confident than males for that item. However, in this item, it was not stated whether those materials were online or offline. Therefore, this item will be discussed in details in the Intellectual Capabilities section of that chapter.

Foundational concepts

Foundational concepts are the basic principles and concepts for the underlying technologies that explain how and why IT works, as well as its potential and limitations. These concepts serve as the basis for understanding new IT as it develops.

In terms of foundational concepts total scores, freshman BIM students rated themselves significantly less confident than other years. Additionally, male students rated themselves significantly higher than female students.

Explaining how a computer operates and defining computer storage, which are the first and the last items of Part 2, are two concepts that can be taught in a class. Moreover, BIM students are taught these two concepts in Business Computer

Applications I course. The significant difference in the mean scores of freshmen and other years, revealed that the students learn these concepts well during the course.

On the other hand, the significant difference between male and female students, in terms of explaining computer operations and defining computer storage, could be explained by different attitudes of boys and girls towards computers. In the research report published by BECTA (2008), it was stated that boys tended to favour technical aspects of computers like hardware, while girls preferred standard applications and social uses of computers.

The 7th and the 8th items in Part 2 – Foundational Concepts were identifying hardware and software problems respectively. Identifying a hardware or software problem are considered as procedural knowledge which requires the performance of some task. None of these two concepts are taught in any course in BIM Department. In contrast to BECTA's report (2008), in the current study, there was no significant difference between freshman and other years or between male and female students in identifying hardware problems. When compared to the other three items in Part 2 (explaining computer operations, identifying software problems and defining computer storage), students perceived themselves less confident in identifying hardware problems both in terms of years and genders. However, as their software skills in using applications increase by years, possibly their ability to identify the possible software problems may increase as well. Therefore sophomore, junior and senior students' mean scores are significantly higher than freshman students in terms of identiying software problems.

Intellectual capabilities

Intellectual capabilities integrate information technology knowledge with the ability to apply information technology in complex situations. These capabilities enable individuals to handle unintended and unexpected problems that may occur. In contrast to most of the contemporary skills and foundational concepts, these capabilities are not formally taught in courses.

The results of this study revealed useful information about the capabilities and the tendencies of the students in terms of their intellectual capabilities. In additon to that, when the item wise analyses were made, statistically significant differences were found in some of the items.

The findings revealed that, there were not any significant differences between years in terms of their attitudes when they had a hardware problem (Item 10). However it is worth to note that while 84% of the students preferred to solve the hardware problem by using online support or knowledge, instead of reading printed references. As a typical characteristic of this generation, they do not like and/or prefer reading printed material. In addition to that, having grown up with computers and the Internet, reaching the Internet is very easy for them. Therefore, it was natural that using printed references was the last alternative for BIM students. In McEuen’s study (2001), when they had a hardware problem, the students preferred to troubleshoot the problem themselves. However, more than 80% of BIM students preferred to either ignore the problem or find a way to work around the problem. However, the dissimilarity between McEuen’s (2001) study and the current study was not confounding. The researcher and the experts agreed on their experiences in IT classes. When an error message related to either a hardware or software problem appears on the screen, instead of trying to understand and solve the problem, students mostly tend to get rid of the message by pressing the Escape key. Due to their inadequate language skills and/or knowledge, they sometimes may not even realize that this is an error message.

On the other hand, two statistically significant results were found in Item 10, between genders. Male students' mean scores were significantly higher than female students in Item 10.b - Troubleshoot the problem option, when they had a hardware problem. While only 37% of the female students agreed that they would troubleshoot the problem themselves, 70% of males agreed for this option. The second significant difference was in Item 10.f – Ask a friend or family member. When they have a hardware problem, while only 56% of the male students preferred to ask a friend or family member, 80% of females did so. In his book, The Woman's Guide to How Men Think (2014), Smith stated that men prefer to learn by doing, not by being told what to do. Hence, if a man is lost, asking for directions is like admitting defeat. It was interesting to see this characteristic in the survey results as well. When there was a hardware problem, female students stated that they would ask a friend or family member for assistance, however male students saw themselves as problemsolvers.

In terms of their confidence in using new technologies, there were no significant differences between BIM students from different years. However, male students' confidence in learning new software applications and using new technologies was significantly higher than female students. These results were also in line with the literature. According to Silver (2001), male students were more interested in how technology 'works', whereas female students focus on how the technology is 'used'.

When BIM students wanted to learn a new function or feature in a software application, more than 90% of the students agreed that they would access online resources. The results revealed that, paralel to their FITness level improvement in years, their self-learning confidence level increased as well.

For learning a new function or feature in a software application, while female students preferred to use application help screens or get assistance from a friend or family member, male students preferred to figure out the learning process by accessing other online resources.

Implications for further research and practice

This research investigated the perceived FITness level of Business Information Management students as they progress through the 4-year university program at Bilkent University and the possible differences between male and female BIM students' fitness levels. The results show that, there are certain similarities as well as differences between the FITness level of BIM students either in terms of years or different genders.

In this research, it has been revealed that perception level of the Business Information Management students' scores increased by years. Freshman students' contemporary skills and foundational concepts perception level scores were significantly lower than sophomore, junior and senior students. However, no significance was found between sophomore, junior and senior students. On the other hand, the instrument used in this study did not contain items related to some of the subjects taught in IT related courses. Therefore a further research should be conducted by using a more comprehensive instrument with network, e-mail and database items added. This study could reveal the possible significant differences between sophomore, junior and senior students.

The results of this study revealed differences between freshman and sophomore students in Part 1 and Part 2 items. Therefore, a follow up study, focusing on the differences between only freshman and sophomore students could be conducted.

In a follow up qualitative study, interviews could be held with the participants, to discuss on the results to broaden the findings of the current study.

The sample of this study was limited to only BIM Department students of İhsan Doğramacı Bilkent University. However, there are three other Business Information Management departments in Turkey, one each in Trakya University, Mersin University and İstanbul Gelişim University. A further study can be conducted with a larger sample and by including participants from these universities as well, to find out the similarities and differences between the same departments of different universities.

The faculty, particularly the instructors giving IT-related courses, can be encouraged to read the findings of the current study, to update and improve their syllabuses, so as to strengthen the FITness levels of BIM students.

BIM Department, once, used to be the certified test center for ECDL. After taking the IT-related courses, students were encouraged to enter the exams to get ECDL certificates. However, the number of students who volunteered to enter the certification exams was rather low. Therefore, the department ended this process.

However, meetings can still be organized for students for informing them about the advantages of being a certified IT user, particulary for entering the workforce. Therefore, the students can be directed to apply for either ECDL or MOS (Microsoft Office Specialist) certifications.

The curriculum committee of Business Information Management Department can review BIM curriculum to provide more options for students to improve the IT skills of the students such as integrating projects requiring IT usage into non-IT courses.

Female students rated themselves significantly lower than male students in items such as using and explaining operating systems or defining computer storage. As mentioned before, these subjects are taught in Business Computer Applications I course. To increase their interest and confidence level in these concepts, the course syllabus can be improved by adding team projects where male and female students can work together. In addition to that, female students can be encouraged to participate in classes more.

Limitations

There were 96 participants in this study. For answering the first research question, the data was analyzed generally as well as by years to determine the FITness level of BIM students. However, the relatively low number of participants was a limitation for the generalizability of this study. Also, the number of female participants were even less than one-third of the male participants. This was another limitation of the study. Therefore as mentioned in the Implications section, a further research study by including students from the BIM departments of other universities can overcome these limitations.

This study was based on a perception survey. However, a self-reported perception level of FITness is not a measure of actual ability, rather it serves as a guide for future technology initiatives. There may be participants who either overestimated or who underestimated their abilities. In Hilberg and Meiselwitz's study (2008), students who overestimated their ability were twice the students who underestimated their ability.

Conclusion

This research study explored the perceived FITness level of Business Information Management students as they progress through the 4-year university program at Bilkent University. The research questions of the current study were:

Main question 1:
Is there any progress in FITness scores of Business Information Management students, as they progress through the 4-year program?

Sub question:
Is there any significant difference between Business Information Management students' perceived FITness level mean scores in terms of years? If so, is it in favor of senior?"

Main question 2:
Is there a difference between female and male Business Information Management students' perceived FITness level scores?

The sample consisted of 96 Business Information Management students. ‘Perceptual Information Technology Fluency Skills Survey’, developed by Sharp (2010), was used in order to collect the data (Appendix 1). The collected data were analyzed statistically by using SPSS 20.0. For the first research question, frequency tables were used and an analysis of variance (ANOVA) was conducted. For the second research question an independent samples t-test was conducted.

In order to meet the needs of the information age and be successful in today’s competitive job market, being fluent in information technology is an essential factor for productivity. The findings of this study showed that, fluency in information technology perception level of the Business Information Management students increased by years, particularly from freshman to sophomore. Therefore the results speculatively indicated that the IT courses offered in BIM curriculum have positive effects on the students’ perceived FITness levels and BIM students generally feel confident and comfortable with technology and learning new applications before graduation.

However, it must be pointed out that a self-reported perception level of FITness is not a measure of actual ability. There are studies in the literature (Ballantine, 2007; Hilberg and Meiselwitz, 2008) which reveal statistically significant over-estimation of skills among the studens surveyed. Therefore, as stated in the Limitations section, it is recommended to conduct a follow-up study for measuring the actual FITness levels of BIM students.

The results of the current study showed that, there were statistically significant differences between the freshmen and the other years about their perceived FITness levels, particularly about contemporary skills and foundational concepts. However, in terms of intellectual capabilities, freshmen rated themselves similar with other years. Therefore, the gap between the freshman and other years was caused by the significant differences in their perceived contemporary skills and their perceived knowledge level in foundational concepts. However, as stated in the Implications section, a further study can be conducted by using a more comprehensive instrument to reveal the possible differences between sophomore, junior and senior students as well.

The results revealed that, BIM students see themselves as problem solvers and independent learners in terms of using information technology. They prefer to figure out IT related issues on their own or with their peers by using online resources. They feel comfortable and confident in troubleshooting the hardware problems, learning new technologies and applications.

The results of the second research question showed that, although no statistically significant difference was found between male and female students about their perceived FITness levels, some statistically significant differences were found in the item wise analyses.

In line with the literature, the results of this study showed that BIM male students have more confidence in technical aspects such as using operating systems or troubleshooting hardware or software problems. During the interview, the department chair recommended that faculty, giving the IT courses, should be inspired to insert team or individual projects into their syllabi. In order to increase the confidence level of female students, faculty should encourage them to participate more in classes by giving presentations or leading these IT project teams.

However, in terms of application using skills and intellectual capabilities, male and female BIM students' FITness levels were similar.

The results of the study revealed that, in terms of solving hardware problems or learning new applications, as a typical characteristic of males, they saw themselves as problemsolvers, whereas female students preferred to get assistance.

It is recommended to conduct a further research study to measure BIM students' actual FITness levels. This further study would help either to validate the findings of the current study or define the possible over or under estimations of the students about their IT fluency skills. This study would also reveal the possible differences between sophomore, junior and senior students.

Faculty giving all kinds of courses can be inspired to integrate uses of information technology into their courses, as well as to require technology-based projects for their students.

Consequently, although the BIM students who participated in this study reported their perceptions of fluency in information technology, it is believed that this study indicates that Department of Business Information Management engages its students in advanced uses of technology and the fluency perception of the students increases by years. There may still be questions not answered. However the further research studies mentioned in this chapter will definitely reveal the answers to them.

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APPENDICES

APPENDIX 1: Data Collection Instrument

Perceptual IT Fluency Skills Survey

Instructions

The survey you are about to take will be used to measure your perception of your information technology fluency skills based on your contemporary skills, foundational concepts, and intellectual capabilities.

The survey has 3 parts:

Part 1 - Contemporary Skills
5 multiple choice questions related to your ability of using application programs.

Part 2 – Foundational Concepts
4 multiple choice questions that focus on your knowledge of computer operations, networks and e-mail.

Part 3 – Intellectual Capabilities
4 multiple choice questions related to your ability to manage computer problems.

The survey will **not** be used for grading purposes in any course. Information you provide is confidential and will only be used in my research study, to examine BIM students' FITness levels.

In answering the questions, please keep these points in mind:

- This is not a test, so there are no right or wrong answers.
- Please don't accidentally skip over questions.
- Provide only ONE answer for any question.
- If there is anything you don't understand, please feel free to ask.
- When you are finished, go back over your survey to make sure that all of the questions have been answered.
- In order for this information to be useful, it is important that you answer each question as carefully and honestly as possible.

Student ID	

Part 1. Contemporary Skills

1. When it comes to using basic operating system features, I consider myself to have

__ No knowledge __ Some knowledge __ Average knowledge __ Expert knowledge

2. When it comes to using a software program to create a text document, I consider myself to have

__ No knowledge __ Some knowledge __ Average knowledge __ Expert knowledge

3. When it comes to using a graphics or art package to create illustrations, slides, or image-based expression of ideas, I consider myself to have

__ No knowledge __ Some knowledge __ Average knowledge __ Expert knowledge

4. When it comes to using a spreadsheet to model simple processes of financial tables, I consider myself to have

__ No knowledge __ Some knowledge __ Average knowledge __ Expert knowledge

5. When it comes to using instructional materials to learn how to use a new application or features, I consider myself to have

__ No knowledge __ Some knowledge __ Average knowledge __ Expert knowledge

Part 2. Foundational Concepts

6. I can explain how a computer operates

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

7. I can identify a computer hardware problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

8. I can identify a computer software problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

9. I can define computer storage

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

Part 3. Intellectual Capabilities

10. If something went wrong with my computer or a computer I was using, I would likely…

a. Ignore the problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

b. Troubleshoot the problem myself

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

c. Find a way to work around the problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

d. Use online support and/or knowledge bases to solve the problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

e. Use printed reference manuals to identify and solve the problem

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

f. Ask a friend or family member for help

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

11. I can easily learn new software applications

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

12. I feel comfortable and confident when using new Technologies

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

13. When I want to use a new function or feature in a software application, I would likely…

a. Use the application help screens

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

b. Read the user manual

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

c. Call a help desk attendee

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

d. Ask a friend or family member

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

e. Access online resources

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

f. Figure it out myself

__ Strongly disagree __ Disagree __ Neutral __ Agree __ Strongly agree

APPENDIX 2: BIM Curriculum

BIM CURRICULUM

FRESHMAN

Semester 1

GE	100	Orientation
ECON	105	Principles of Economics I
BIM	100	Introductory Mathematics
BIM	103	Keyboarding
ENG	101	English and Composition I
SOC	101	Introduction to Sociology
TURK	101	Turkish I

Semester 2

ECON	106	Principles of Economics II
BIM	107	Calculus for Business Studies
BIM	121	Business Computer Applications I
ENG	102	English and Compositon II
PSYC	100	Introduction to Psychology
TURK	102	Turkish II

SOPHOMORE

Semester 3

GE	250	Collegiate Activities Program I
BIM	122	Business Computer Applications II
BIM	205	Principles of Accounting
BIM	201	Problem Solving & Algorithms
BIM	223	Business Communications
BIM	418	Management Information Systems
		Unrestricted Elective

Semester 4

GE	251	Collegiate Activities Program II
BIM	215	Database Management Systems
BIM	224	Managerial Communications
BIM	260	Finalcial Statement Analysis
HIST	200	History of Turkey
		Unrestricted Elective

JUNIOR

Semester 5

BIM	108	Business Statistics
LAW	313	Law for Business
BIM	206	Managerial Accounting
BIM	242	WEB Site Development
BIM	390	Summer Training
		Restricted Elective I

Semester 6

BIM	310	Semester Internship

SENIOR

Semester 7

BIM	261	Corporate Finance
BIM	375	Public Relations
BIM	341	Web Based Application Development
		ELECTIVE II
		ELECTIVE III

Semester 8

BIM	316	Information Systems Analysis
BIM	417	Senior Seminars in BIM
BIM	492	Strategic Management
		ELECTIVE IV
		ELECTIVE V

APPENDIX 3: Curriculum Vitae of Nur Sağlam

CURRICULUM VITAE

NUR SAĞLAM

Educational Summary

1996 – 1998	**GAZI UNIVERSITY,** Institute of Social Sciences Master of Business Administration -MBA with Thesis
1987 - 1991	**MIDDLE EAST TECHICAL UNIVERSITY** Department of Business Administration BS Diploma
1980 - 1987	**ANKARA ATATÜRK ANADOLU LİSESİ** High School Diploma

Professional Summary

March 1999 – present	BILKENT UNIVERSITY, School of Applied Technology and Management Department of Business Information Management (BIM) *Department Chair*
July 1997 - March 1999	BILKENT UNIVERSITY, School of Tourism and Hotel Mgmt Department of Office Management in Tourism *Assistant Chair*

Sept 1994 - July1997	BILKENT UNIVERSITY, School of Tourism and Hotel Mgmt Department of Computer Technology in Tourism *Instructor*
Sept 1991 - July 1994	SEZA TEKNİK CİHAZLAR LTD. ŞTİ, SOKKIA Surveying Instruments *Marketing and Administration*
Summer 1991	IBM / BORDATA *Intern*

Major Responsibilities and Duties

Internally my day-to-day responsibilities cover the spectrum of academic and administrative management duties: People management; budget and expense control; planning and maintaining IT resources for the school; BIM academic scheduling and resource allocation; conflict resolution; School Board and Executive Committee membership duties. Plus, I am a skilled instructor with years of experience teaching applied topics to students from a variety of backgrounds, Turkish and international. These students usually display a wide range of learning abilities and motivations—this makes the work both more challenging and interesting.

APPENDIX 4: Curriculum Vitae of Arzu İkinci

CURRICULUM VITAE

Name and Surname : Arzu Sibel İkinci

EDUCATION

Postgraduate : (2012 – 2016)

İhsan Doğramacı Bilkent University, Graduate School of Education

MA in Curriculum and Instruction

ANKARA

Graduate : (1983 – 1987)

Hacettepe University, Faculty of Economics and Management

Department of Economics

ANKARA

High School : (1980 – 1983)

Ayrancı Lisesi

ANKARA

WORK EXPERIENCE

1996-Cont.

İHSAN DOĞRAMACI BİLKENT UNIVERSITY- SCHOOL OF APPLIED TECHNOLOGY and MANAGEMENT DEPARTMENT OF BUSINESS INFORMATION MANAGEMENT

	Duration	: FEB.1996 – cont.
	Job Title	: Instructor, Assistant Chair
	Job Definition	: Developing new courses; teaching new and existing courses, advising and supervising department students; organising, contributing and participating in workshops, seminars, conferences; coordinating and participating in School/Department Committees and Workgroups; representing Bilkent University in an EU Universities Grant.
1994-1996		
	BAYINDIR HOLDİNG A.Ş.- COMPUTER CENTER	
	Duration	: SEP.1994 – FEB.1996
	Job Title	: Computer Trainer and Software Support Specialist
	Job Definition	: Planning and providing computer courses; translating and preparing training documents; supporting holding staff for software products, preparing annual reports to the board of the directors.
1989 - 1994		
	BELKO LTD.ŞTİ.	
	Duration	: NOV.1989 - SEP.1994
	Job Title	: Founder and Director of Training and Documentation Department
	Job Definition	: Managing Training and Documentation Department. Organizing, preparing, and offering continuous courses; translating and preparing training documents; archiving softwares and sources; preparing montly reports to the director of the Computer Center.
1987 - 1989		
	INFO Otomasyon ve Telekomünikasyon A.Ş.	
	Duration	: DEC. 1987- NOV.1989
	Job Title	: Sales Representative
	Job Definition	: Selling computer and computer assisted products.

TEACHING and SUPERVISION

Business Computer Applications I (Hardware/Software, Wordprocessor, Presentation Program), Business Computer Applications II (Spreadsheets), Web Based Application Development (PHP), Web Site Development (HTML, PaintShopPro, Firefox, FrontPage, DreamWeawer), Knowledge Management in Business (shared with other instructors 4th year elective course), Hospitality Industry Computerization (Fidelio Front Office Management), Business Computer Applications (Fidelio Food and Beverage Management), Selected Topics in Information Management (Web Design for Tourism Management students as 4th year elective). Senior Project Supervision, Industrial Training Supervision, and Term Project Supervision.