

# Comparison of OSRA Educators and AITP Industry Personnel Telecommunications Course Content Lists

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## Abstract

Through the completion of two Delphi studies with two different groups, telecommunications course content lists were created through common consent. Common consent was defined as two-thirds of the participants rating each course content topics/subtopic with a five (Definitely Do Include). An industry group (Association of Information Technology Professionals – AITP) and an education group (Organizational Systems Research Association – OSRA) were the participants in these two Delphi studies. The goal of the research was to develop an industry-based course content list and an education-based course content list for a beginning telecommunications course at the college/university level and compare the two lists. The two lists are compared and similarities and differences are noted in this manuscript.

## Introduction

Preparing students to be competent in the Information Technology (IT) world is a goal of technology-based departments in colleges and universities. Telecommunications is one part of the IT area in which students need to be prepared and is also a part of the Organizational & End-User Information System (OEIS) Curriculum. The challenge of keeping up with an ever-changing information technology environment provides a challenge to academicians. This study involved seeking input from IT professionals and IT educators to assist in keeping telecommunications curricula current.

Educational institutions must be willing to review and revise curriculum content to keep the information current so that graduates will be competent when they enter the IT workforce. Noll and Wilkins (2002) note that it is recognized that the need for information systems workers is growing, but the identification of the specific skills required for a variety of these types of positions is not as clear. Clarifying one course, such as telecommunications, which is a part of the information systems/technology area is a step toward identifying content areas and, in turn, skills for which graduates of such programs should have upon graduation.

Many colleges and universities teach telecommunications courses at different levels or incorporate telecommunications topics in more than one course. This research is an extension of a 1997 initial Delphi study dealing with course content for a beginning telecommunications course at the college or university level. The initial (1997) study was completed with OSRA participants.

## Methodology

In the current study, two Delphi studies were completed with two different groups. One group was from industry (Association of Information Technology Professionals – AITP) and the other group was from education (Organizational Systems Research Association – OSRA). The goal of the research was to develop two telecommunications course contents lists: an industry-based course content list and an education-based course content list for a beginning telecommunications course at the college/university level. The lists were then compared and the similarities and differences are noted in this manuscript.

The final common consent course content topics and subtopics from the initial 1997 study served as round one data for the participants for the current modified Delphi study. Four rounds were completed in the Delphi study. During rounds one and two the participants were allowed to add, delete, and edit the existing topics and subtopics. In round three the participants rated the importance of keeping a topic or subtopic in the course content list using a one to five Likert scale. A rating of five indicated 'Definitely Do Include the Topic' and a rating of one indicated 'Definitely Do Not Include the Topic.' In round four participants were reminded of the goal of the study and were provided with their score for each item and the group mean for each item. Participants could then keep their previous rating or change their rating.

This study identifies the common consent (as in the initial 1997 study for consistency) as two-thirds of the participants rating the topics/subtopics with a 5 – Definitely Do Include the Topic. Consensus is obviously identified as all participants rating the topics/subtopics with a five. These two telecommunications common consent course content lists from the two groups provides an opportunity for comparison between an education-based group and an industry-based group.

## Findings

There were some similarities in the two telecommunications common consent course content lists between the OSRA and AITP participants. However, differences in specific areas were also evident. Before the similarities and differences are noted, it is important to provide a basis with the numbers of topics and subtopics (See Table 1). Topics are basically content areas such as Models and Protocols and subtopics are specific items such as OSI Model or TCP/IP which would fall under the topic of Models and Protocols.

Table 1  
Overall comparison of common consent course content list by number of topics and subtopics

	Initial 1997 Common Consent Course Content List (which served as Round 1 for the OSRA and AITP participants in this study)	OSRA Final Common Consent Course Content List	AITP Final Common Consent Course Content List
Topics	10	9	9
Subtopics	30	45	35
Topics Reaching Consensus	1 (Local Area Networks)	0	4 (Introduction to Basic Network Components; Network Architectures; Emerging Technology (Local and Global); Securing a Network)
Subtopics Reaching Consensus	0	12	3

The initial list was reduced by one topic; however, it was not done simply by eliminating a topic, but by combining topics and rewording topics. The OSRA participants reached consensus on more subtopics (12) than any other group, but less topics (0) than any other group. The AITP participants reached consensus on fewer subtopics (3) than the OSRA participants, but reached consensus on the most topics (4) of any group. When comparing the two course content lists, some topics and subtopics were similar. They are not necessarily exact, but are similar (See Table 2). There are also some specific differences in the two common consent course content lists (See Table 3).

Table 2

Similar topics and subtopics between the two common consent course content lists

\*Consensus items are noted with \*

	OSRA	AITP
Topic	Conceptual Foundations	Introduction to Basic Network Components*
• Subtopic	• Role of telecommunications in business*	• Role of telecommunications in business
Topic	Communications Media	Network Hardware and Media
• Subtopic	• Wire media (twisted pair, coaxial cable, fiber optics, Category 5, 5e, 6, 7)*	• Wire media (twisted pair, coaxial cable, fiber optics)
• Subtopic	• Wireless media (laser, radio frequency, infrared, cellular, microwave, satellites, etc.)	• Wireless media (radio frequency, infrared, digital satellites)
Topic	Communications Hardware	Network Hardware and Media
• Subtopic	• Network hardware components (servers, repeaters, hubs, bridges, switches, routers)	• Network hardware components (servers, repeaters, hubs, bridges, routers)
Topic	Local Area Networks (LAN) and Topologies	Network Architectures*
• Subtopic	• LAN configuration (Internet working LANs, bridges, routers, gateways, etc.)*	• LAN configuration (Internet working LANs, bridges, routers, gateways, etc.)
• Subtopic	• Network operating systems (Windows NT, 2000, XP, Unix, Linux, Novell, etc.)	• Network operating systems (Novell, NT Server, Banyan Vines, etc.)
Topic	Protocols and Standards	Network Architectures*
• Subtopic	• Protocols and Standards*	• Protocols (TCP/IP, NETBEUI, IPX/SPX)
Topic	Protocols and Standards*	Models and Protocols
• Subtopic	• OSI Model (7 layers)*	• OSI Model
• Subtopic	• TCP/IP*	• TCP/IP

Topic	Telecommunication Systems/Applications	Emerging Technologies (Local and Global)*
• Subtopic	• Internet, Intranet, Extranet	• Intranets (VPNs)
• Subtopic		• Extranets
Topic	Security/Legal	Securing a Network*
• Subtopic	• Security (firewalls, VPNs, public and private key encryption, digital signature)	• Firewalls*
• Subtopic		• Secure Communication Systems

These similarities primarily include the basics of a telecommunications course. The role of telecommunications in business, communication media, LAN configuration, protocols, the OSI model, hardware, operating systems, and basic network security are a few of the basics. Telecommunications is a large part of the information systems environment. Those responsible for teaching key courses in the area of information systems must ensure that the basics are taught so that the students can build upon this knowledge. Research by Gonzenbach (1998) resulted in the recommendation that most emphasis in IS education should be placed on teaching the following: telecommunications, operating systems, systems analysis and design, networks and business communications.

The differences in the two common consent course content lists are basically where emphasis is placed on the variety of topics. Table 3 is a brief outline of the differences in the two common consent course content lists.

Table 3  
Differences in topics and subtopics between the two common consent course content lists

\*Consensus items are noted with \*

OSRA	AITP
Included Data Signals topic emphasizing analog vs. digital*; converting data into signals; transmission methods (asynchronous/synchronous)*; transmission modes (simplex, half-duplex, duplex)*; modulation; error detection and control; and baseband vs. broadband.	Expanded more on introduction to Basic Network Components*
Full topic on LAN	More in depth on Securing a Network*
Full topic on WAN	Emphasized network management and performance

Expanded more on communications hardware including NIC and modem

Emphasized emerging technologies

No consensus on topics

Consensus on four topics

The basic network components are expanded upon more by the AITP group along with network management, emerging technologies, and securing a network. Security has been an important element in telecommunications, and will become more important in the future. Network security and encryption of passwords are gaining more attention as businesses and educational institutions install wireless networks. Due to the access to data and the flaws in network topologies, improved security is necessary. Improved security standards are being developed by the Institute of Electrical and Electronics Engineers (IEEE). Network administrators are learning how to update, maintain, and protect their data, users, and investment in telecommunications environments with and without wires.

### Discussion

Based on the comparison of the two telecommunications common consent course content lists it is obvious that both groups agree on a common basis of content areas that must be included in a beginning telecommunications course. Both groups noted that the role of telecommunications in business, wire and wireless media, network hardware, LAN configuration, operating systems, protocols and standards, the OSI model, and TCP/IP should be included in a telecommunications course. Many who teach telecommunications will agree that these are the basics to cover in a beginning telecommunications course.

The consensus items noted by the OSRA group fell under the following topics: Conceptual Foundations (one of the two subtopics), Protocols and Standards (all three subtopics), Data Signals (four of seven subtopics), Communication Media (one of five subtopics), Communications Hardware (one of four subtopics), and Local Area Networks (LANs) and Topologies (two of eleven subtopics). The AITP group put much more emphasis on reaching consensus on the following four topics: Introduction to Basic Network Components, Network Architectures, Emerging Technology (Local and Global), and Securing a Network. Three of the subtopics under the Securing a Network topic also reached consensus. Therefore, the AITP group put more emphasis on security than any other topics and also expanded on the basic components and did not put emphasis on analog/digital, converting data into signals, transmission methods (asynchronous/synchronous), transmission modes (simplex, half-duplex, duplex), modulation, and baseband/broadband.

The OSRA group included a Security/Legal topic; however, it did not reach consensus nor did any of the three subtopics. The subtopics under the Security/Legal topic dealt more with privacy, firewalls, and encryptions; however, the AITP Securing a Network topic dealt more with identifying security threats to the network, PC and server security, along with firewalls and physical and human security issues. Security is obviously an important topic in the workforce. Roberts (2004) notes that "There was a time when cutting-edge network security meant a firewall on your perimeter and anti-virus software on the desktop. No longer" (p. 15).

As the differences show an emphasis in some different areas between the two groups, it is essential to note that the course consensus lists are provided as a guideline for those updating an existing telecommunications course or teaching one for the first time. A look at the consensus (every participant rating the item with a five – Definitely Must Include Topic) serves as a brief outline of the items that each group believed to be most important items to include in a beginning telecommunications course.

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