

# Automobile Traffic Impact of Distance Learning

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## INTRODUCTION

In industrial societies, and also in developing countries, automobile travel is increasingly associated with pollution, congestion and urban sprawl, entailing social and economic costs for both drivers as well as communities. Increasing travel volume and longer average commute, much of it spent stuck in traffic, are taxing community and private resources. Experts from various disciplines agree that it is desirable to manage this increase and at the same time slow the rate of growth. Building additional highways is not considered a desirable alternative in terms of both ecological and monetary costs.

Under these conditions, virtual mobility, involving the use of interactive technologies, may prove to be a viable alternative for activities that otherwise require physical transport. It can aid in the reduction of miles traveled and resulting environmental, social and economic impacts. Interactive applications include telework, telebanking, teleshopping, telemedicine and distance learning (DL), which generate considerable revenue from sources other than limited household media and communication budgets (Mundorf & Bryant, 2002).

While there is some empirical research on the impact of interactive technologies on travel behaviors, many of the potential benefits have yet to be realized. Research on the traffic impact of DL is even more limited. Besides technical factors and economic cost, the primary reason is human behavior. In industrial societies, we continue to engage in a pattern of single-

occupant vehicle travel, in spite of increasing pollution, congestion and inconvenience.

## IT and Transportation Systems

Mobility has become an economic as well as a lifestyle attribute in advanced societies (Zelinsky, 1971). Zoche, Kimpeler and Joepgen (2002) point out that *circular mobility* (i.e., mobility without change in residence) has increasingly attracted research attention due to its environmental impact on pollution, congestion, noise and so forth. Since communication is no longer tied to physical transport, many functions that in the past required physical travel can now be fulfilled via communication media.

Mokhtarian (1990) conceptually discusses the variety of demand-and-supply relationships between telecommunications and transportation. All communications require some form of transportation and could take one or more of three forms: (i) transportation of people to meet face to face; (ii) transportation of objects, such as letters, books, newspapers and so forth; and/or (iii) transportation of electronic impulses. Mokhtarian uses historical, anecdotal, abstract and hypothetical examples to support the theory that “the actual amount of personal travel increases as part of a general expansion in communications, even though transportation’s share as a mode of communications declines” (p. 236). In other words, there is an overall steep increase in the amount of communication, but a more moderate increase in physical transport. Similarly,

Niles (1994) considers both the trip elimination effects of telecommuting and its trip generation potential. Notably, telecommunications may lead to greater urbanization and a wider range of economic activities, which can lead to increased traffic volume.

The positive impact of increased communication on physical transport of persons and goods has been reported in some studies. Canzler and Knie (2000), for example, found that the amount of time spent on travel has remained constant, but the distances covered tend to increase consistently. In a large-scale study, Zoche et al. (2002) analyzed the travel impact of virtual mobility in three areas: chat, online banking and online travel offerings. Even though all three modes have potential for travel reduction, only online banking led to a net reduction in miles traveled. For the other two areas, potential miles saved were offset by increased travel resulting from new acquaintances and group memberships (chat groups) or from travel bargains found online vs. traditional travel booking channels. The environmental impact of online shopping was less clear. While there is a substitution effect for trips to shopping centers and stores, deliveries to residential areas increase (Fichter, 2004).

Research on the traffic impact of DL is very limited. DL permits students to participate in many academic activities from home, from work or from satellite locations. It can replace library work, meetings and traditional face-to-face class meetings. The potential for reducing traffic to campus is considerable for a variety of student groups – particularly off-campus students, and even more so for working part-time and non-traditional students.

The issue of reducing or modifying travel through DL, particularly DL offered via Internet, has not been addressed in a satisfactory way. For instance, Shifter (2002) lists 29 motivating and 17 inhibiting factors for faculty participation in DL programs; the only one even remotely travel-related, is ranked 27 out of 29 motivators: “Ability to reach audiences that cannot reach classes on campus” (Shifter, 2002, Table 1). Similarly, Halsne and Gatta (2001) compared learner characteristics of traditional and online students; again, none of them was related to transportation.

## **COMPARING VIRTUAL SUBSTITUTES FOR MOBILITY AND TRAVEL**

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- **Telework:** Interactive communication technology has been shown to affect travel behavior, and a number of studies have explored the impact of communication and information technology (Niles, 1995). Much of this work is related to the impact of telework on travel behavior in a number of projects in California (Nelson & Niles, 1999).

While it is difficult to document the actual impact of telework, some encouraging data exist. Mokhtarian (1997) discusses the overall impact of telework on traffic volume. She reports a savings of 31 vehicle miles traveled per telecommuting occasion. The number of miles saved outweighed, by far, the amount of travel generated by telecommuters. Mokhtarian (1997) projects an overall savings potential of less than 1% of vehicle miles through reduced travel resulting from telework. The overall impact is limited due to the small number of teleworkers as a percentage of the total population. Furthermore, telecommuting tends to be primarily part-time, usually one or two days/week. For the typical telecommuter, 25% or 30% of work-related travel is eliminated, rather 80% or even 100%.

In addition, the impact of telework on travel behaviors is limited due to effects of *trip chaining* and the reduced use of carpools and public transportation. Gärtling, Gärtling and Johansson (2000) assessed options for car-use reduction measures in Swedish households. Trip chaining and choice of closer venues was preferred for shopping and leisure activities; for work, alternatives such as biking and public transit were chosen. Subsequent travel diaries, however, revealed a lower level of reduction in car use than originally expected. Shopping and leisure trips, often not planned far in advance, are especially less likely to be subject to rationalization measures. However, the effect on traffic volume could become stronger with increased telework adoption; it is more pronounced in areas with higher concentrations of teleworkers.

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