VIEWDATA AND TRAINING: WHAT, WHERE, AND HOW MUCH

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ABSTRACT

The name Viewdata has received considerable publicity, not all of
it very informed. This paper outlines briefly what Viewdata is,
how it works, and what it costs. It then discusses the
educational uses and limitations of Viewdata.

INTRODUCTION

The name Viewdata has received considerable publicity, not all of it very informed. In this paper I will try to outline briefly what Viewdata is, how it works, and what it costs. Also, I will outline some thoughts about educational uses and limitations of Viewdata. These are first thoughts because it is early days yet. There are few sets around, and both the sets and the service are expensive, so necessarily the emphasis so far has been on commercial aspects of Viewdata.

Nevertheless, the British Post Office is committed to building a nationwide information service. Access is simple, sets are large and colorful, and there may be good educational uses of such a system that we should consider. Other countries are developing similar systems, although all of them so far are in a variety of trial phases, and already standards and techniques are beginning to diverge.

I believe, therefore, that it is useful to outline how Viewdata works in the United Kingdom (UK), and to point to the cost factors for users and providers of information which, I believe, will be of critical significance in educational applications.

WHAT IS VIEWDATA?

The British Post Office (BPO) developed Viewdata starting in the mid-70s. Their principle aim was to increase domestic use of the telephone, particularly in off-peak periods, by offering a com puter based information service to the home. The technology was to be simple, cheap, and easy-to-use. These aims were achieved only to varying degrees.

System Components

There are three components to the system -- the receiver, the transmission medium and the database.

Receiver - The receiver is usually based on a domestic color television set, to which is added a character decoder and generator, an autodial unit and an integral modem. A very significant concession for the future was permission from BPO to allow the modem to be built into the set, and so far this has not been followed by the other PTTs (telephone operating organizations which in Europe are government-controlled monopolies).

The character set includes the normal (ASCII) typewriter charac-
ters, seven colors and a set of rather coarse-scale block graph-
ics characters. The screen capacity is limited to 40 characters
x 24 lines, which makes the sets somewhat incompatible with other
computer terminals and applications.

Sets are now being produced by about a dozen large manufacturers
in small numbers. Sets still cost around 900 pounds (UK), com-
pared to about 300 pounds for a standard television set. Thus,
one of the initial aims, cheap sets, has not been realized be-
cause of the classic "chicken and egg" situation of small demand
causing small production and high costs. Optimistic forecasts
predict an "add-on" price of about 100 pounds but only with very
large scale production. Sets can now be rented for about 30
pounds per month.

An interesting and hopeful development is the appearance of
separate decoder and modem units, inputting into an existing
television's aerial socket. The quality of the picture, in
general, is less satisfactory, but prices are around 300 pounds
and beginning to fall.

The autodial unit contains two Post Office telephone numbers and
a user/password number -- set up by the television supplier in
conjunction with BPO. Thus changing from a normal television
channel to Viewdata requires only one button-push to connect to
the phone-line, dial, and log on. Two telephone numbers are used
so that access to a back up system is automatic in the case of
system failure, i.e., the failed system sounds busy and the
second number is used on the next try. In fact the sets auto-
matically alternate between the two numbers and the user is not
normally aware of which system he or she is using, but rather
builds up a bill on both. BPO allows the sets to contain other
telephone numbers as well, opening the way for private Viewdata
systems to compete.

Transmission - The sets transmit at 75 baud and receive at 1200
baud in full duplex, asynchronous mode over standard telephone
speech lines.

Database - The database is operated on a number of GEC 4082 mini
computers with software written by BPO in Babbage, GEC Computer's
high level assembly language. The current database is on 6 x 70
mbyte discs, giving about 250,000 frames, i.e., screenfuls. BPO
will double this database capacity later this year and thereafter
will move to 270 mbyte discs if necessary.

What Is the Relationship Between
Viewdata and Teletext/CEEFAX/ORACLE?

Viewdata has become the UK generic name for this kind of informa-
tion service, providing its data via telephone lines. The Euro-
pean name is "video text" or sometimes "interactive videotext."

Teletext refers to a broadcast information service, using some
spare television lines on an existing television channel. This
requires a decoder and character generator, but not the modem or
autodialler that Viewdata needs. A cycle of frames is broadcast
continually, and the user, having input to the set the frame
number required, has to wait until that frame is next broadcast.
The frame is "caught" and held in local store indefinitely.   BBC
have a teletext system called CEEFAX. The Independent Television
system is ORACLE.

The advantage of Teletext is that once the necessary set with its
decoder is purchased or rented, the service is free to use. The
disadvantage is that with a frame output rate of about two frames
a second, the total number of frames has to be limited to about
100 frames, otherwise the mean wait time becomes excessive.   The
system is, of course, unlimited in its potential number of users.
As will be discussed later, Viewdata is only limited in its
database size by economics and the limits of computer technology,
but is expensive to use.

Teletext, therefore, is a complementary service, very good for
news broadcasts, sports results and weather reports, but not
suitable for detailed specific information services.   Fortunate-
ly, BPO and the Teletext developers have agreed on the same
character set, so that a Viewdata set is good for Teletext, but
not vice versa (because of the lack of a modem).

                WHAT IS ON VIEWDATA AND WHO PUTS IT THERE?

BPO operates Viewdata (now called Prestel for copyright reasons)
as a common carrier. Thus, if there is space available, anyone
can rent frame space and create frames of data with no BPO con-
trol of the contents. The Information Provider's contract sub-
jects him to the normal laws regarding libel, obscenity, fraud,
etc., and BPO can "lock out" frames that cause complaints.
However, interesting problems lie ahead because newly edited
information is more-or-less instantly available over the whole
network and there is no way BPO can prevent that happening.

The Information Provider (IP) pays a membership fee of 4,000
pounds per year, and a frame storage fee of 4 pounds per frame
per year. Thus an IP's investment, which has to include editing
staff and equipment, editing telephone charges and BPO charges,

is not negligible and this is reflected in the high user charges (more on this later).

There are about 150 IPs so far including airlines, newspapers, banks, leisure industries, government bodies and commercial organizations offering share prices. Many of them are taking part on an experimental basis only as they wait to see the level of interest and acceptance. The IP can set an access charge on each frame which can vary from 0p to 50p. For example, British Airway's timetables are free, most of the "domestic" frames, such as consumer product surveys, games and quizzes are in the range of 1p-3p per frame, and share prices may be 10p per frame. The IP can also screen-off his data into a Closed User Group and in some way "sell" access to it by "selling" privileged user numbers.

HOW DOES THE USER ACCESS THE INFORMATION
AND WHAT DOES IT COST?

Having automatically dialled-in and logged-on, the user can access frames in two ways. The only input allowed is numeric and two other keys (* and #), usually from a hand-held remote control keypad. Each frame can point at up to 10 other frames by means of a menu with choices labelled 0-9. Thus the database is a tree structure starting at a main index on page 0 and the user can work down through successively more detailed index pages until "real" data is found. The top levels of indexing are provided by BPO and lead down to the start of each IP's own dataspace.

Alternatively, the sequence * XXXX # can be input where XXXX is a frame number up to 10 digits long. A number of printed directories are available now which work like "yellow pages", relating IP services and the appropriate frame number. Usually that particular frame is the IP's own index to his sub-tree of information.

Some user sets have a facility to store up to 16 frequently used frame numbers in this way, similar to the store and autodial facilities in modern telephone systems. This feature is of great value, for example, to a user interested in share prices which change but are always on the same frames. The user saves time and money by directly accessing these frames.

One problem with this numeric form of addressing, particularly as the database grows, is that frame numbers become very long. Keying errors increase, particularly with small, hand-held keypads, and if you happen to access an expensive frame by accident, you pay for it.

The user pays three charges:

     1.   The normal telephone charge, which in the UK is 20p for
        10 minutes in a local call area.

     2.   A connect time charge of 3p/minute for use of the
        computer service.

     3.   The frame charge set by the IP (0p-50p).

The first charge goes on the user's telephone bill and the other
charges form a separate Prestel bill. BPO collects the frame
access revenue for the IP less a 5% collection fee.

The existing database is very varied in the quality of the data
it offers, in content, layout and structure. It is still quite
easy to end up in a "blind alley" with no real data or alternate
paths available, as some IPs have either lost interest or not
learned the new arts and skills involved in this new medium.
Some of the best data is of the share price type with a number of
IPs, including the Stock Exchange, offering competing services
for business users. The business use of the system is growing
much more rapidly than domestic use, for the obvious reasons that
the price of sets, telephone calls and frame charges are less
critical for business users.

In total, there are about 160,000 frames of data and about 4,500
users (July 1980), of which 4,000 are business users and 500
domestic. These figures include users who are in the Viewdata
business anyway, and the number of "genuine" users is consider
ably smaller but difficult to estimate.

WHERE IS VIEWDATA?

Viewdata in the UK

Consider first the UK (see Figure 1). BPO is building a star
network, centered in London. Thus IPs create their frames by
manual editing, sending magnetic tapes, or in a few cases by
computer-to-computer links, to a central database in London. A
number of intelligent editing terminals are appearing on the
market, based on micros or very small minis. These usually have
a floppy disk, editing software and the ability to store a few
hundred frames. These can be loaded into the Prestel database
either at 300 baud in a "bulk load" format, or at 75 baud in a
simulation of a manual editor. Current prices for these termi-
nals are in the range 8K-10K pounds.

BPO then copies every new or changed frame to the user-access
computer centers around the UK, so that the same database exists
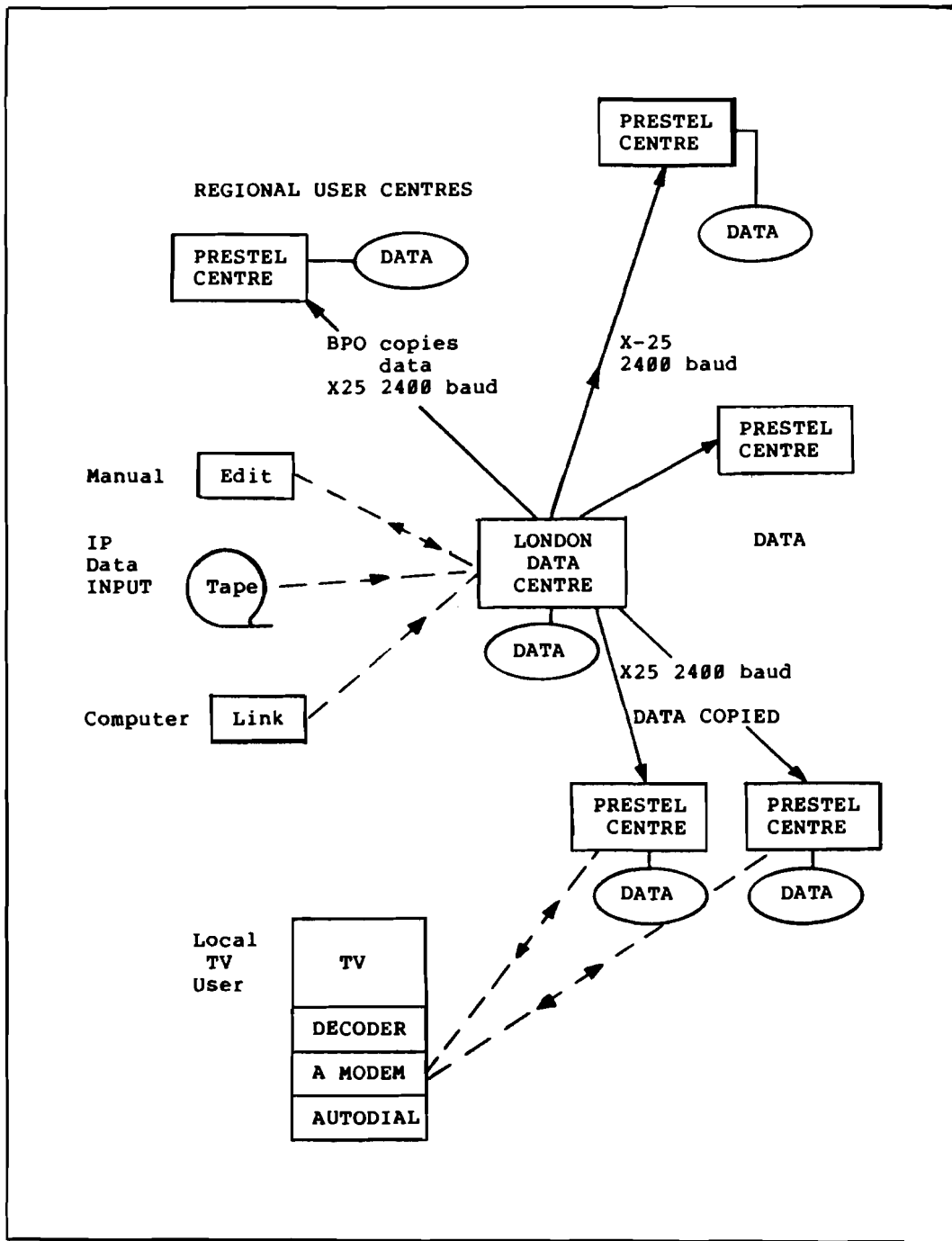
Figure 1

THE UK PRESTEL STAR NETWORK

on all the computer centers, i.e., there is no regional variation
of data, although that may come at a later stage. A major disin-
centive to IPs is the cost of editing into the central London
database if they are outside the London local call area. For
example, peak rate calls over 35 miles, which covers nearly all
the major business centers outside London, cost nearly 15 pounds
per hour.

The connection between the central database and the regional
copies is via 2400 baud leased lines using X25 permanent (not
packet switch) circuits. At some later stage BPO may extend the
system to allow user-inquiry route-through to regional centers,
but this is not in the existing system. No doubt the Prestel
system will make use, eventually, of the national X25 packet
switching service being developed separately by BPO.

Billing and statistics gathering is done on the central database
system and this involves collection by BPO of bill information
for each user from the two regional centers his or her television
set is programmed to telephone.

There is no direct link between the user and the IPs, but an IP
can create a "user response" frame containing data entry fields.
These can be used as an order form to be completed by the user.
The system fills in the user's name and address, and the com-
pleted frame is stored for later examination by the IP on the
central database system. This can be used as a kind of "off-
line" order entry system and operates at the same level as a
newspaper coupon but without the postal delays.

Five user centers are open in London and two in each of the
following cities: Birmingham, Nottingham, Edinburgh, Glasgow,
Manchester, Liverpool and Belfast. Thus there is already a
service covering the principal business areas of the UK with a
present capacity of 914 user ports, i.e., simultaneous calls.
BPO plans to open centers in Luton, Reading, Sevenoaks, Brighton,
Leeds, Newcastle, Cardiff, Bristol, Bournemouth, Chelmsford and
Norwich by the end of 1980. Some of these will be multiplexors
into other centers rather than computer centers themselves.

BPO's investment in computers, buildings and staff, plus many
man-years of research and development, is considerable, and there
is concern over the slow build-up of users. Initially the prob-
lem was lack of sets, but the present production of about 1,000 a
month is now exceeding demand. The IPs are becoming concerned
and some have already withdrawn, seeing no reasonable return on
their investment in the short-to-medium term.

Thus there are problems ahead for Prestel, particularly in the
present UK economy. One good measure is that the high-street
television retailers and rental outlets are beginning to display
teletext sets, but Prestel sets are few and far between.

Viewdata in Other Countries

The PTTs of Germany, Holland, Switzerland, Austria and Hong Kong
have now bought the Prestel software and GEC 4000 Series compu-
ters. All of these countries plan limited market trials and
demonstrations over the next few years.

The most significant development, both in scale and complexity,
is in Germany where the PTT is developing Viewdata as a "gateway"
into private systems as well as offering a central information
service on the PTT-operated courses. Thus the user (of Bild-
schirmtext) will be able to access frames in the same way as in
Prestel, i.e., on a central database, but some of these frames
will offer access to other computers.

When the external access is chosen, an X25 based connection
between that user and the external computer will be established.
At the simple level, the external computer will offer a logical
extension of the central database, i.e., input frame requests and
output complete frames over the link. However, a more extensive
virtual terminal protocol has been defined which allows for,
among other things, the transmission of data entry fields as well
as text, and collection of the completed fields from the user.
Thus the way is open for full transaction processing services to
be offered on privately operated external computers. These
might, of course, include educational services, but the principal
interest comes from mail-order houses who see the system provid-
ing on-line ordering from agents or customers at home, usually in
conjunction with the printed catalogue. The crude nature of the
graphics precludes use of this medium as a substitute for picto-
rial catalogues.

The Bildschirmtext market trial, just started, is based on GEC
4082 centers in Dusseldorf and Berlin, and will run for 1-2 years
with 4000 users. These centers offer X25 at 9600 baud over
leased lines (since no packet switch service is available yet)
and it is intended that each center will provide eight such
connections and about 150 user-ports (see Figure 2).

Because a majority of the IPs taking part in the market trial
operate IBM mainframes which do not offer X25, an additional
complication is the provision of a front-end machine (also a GEC
4082) based in Dusseldorf. This will accept three X25 inputs
from the Dusseldorf center and three from Berlin, and output 16
BSC lines at 4800 baud. The Bildschirmtext virtual terminal
protocol, using X25 as its carrier, will be translated in this
front-end into IBM 3270 protocol using BSC. Thus, on-line con-
nection to IBM mainframes will go through this system. One such
connection, to the mail-order house Quelle in Nuremburg, is
operating already on an experimental basis.

To allow for character set variations in different languages,
such as the umlatt in German, agreement has now been reached on

Bildschirmtext (BT) External Computer Links

Dusseldorf

BT-users

BT-Centre

Berlin

BT-users

BT-Centre

X25
9600
baud

BT-virtual
terminal protocol

FEP

X25
9600 baud
to main
frames

X25
9600 baud
to main
frames
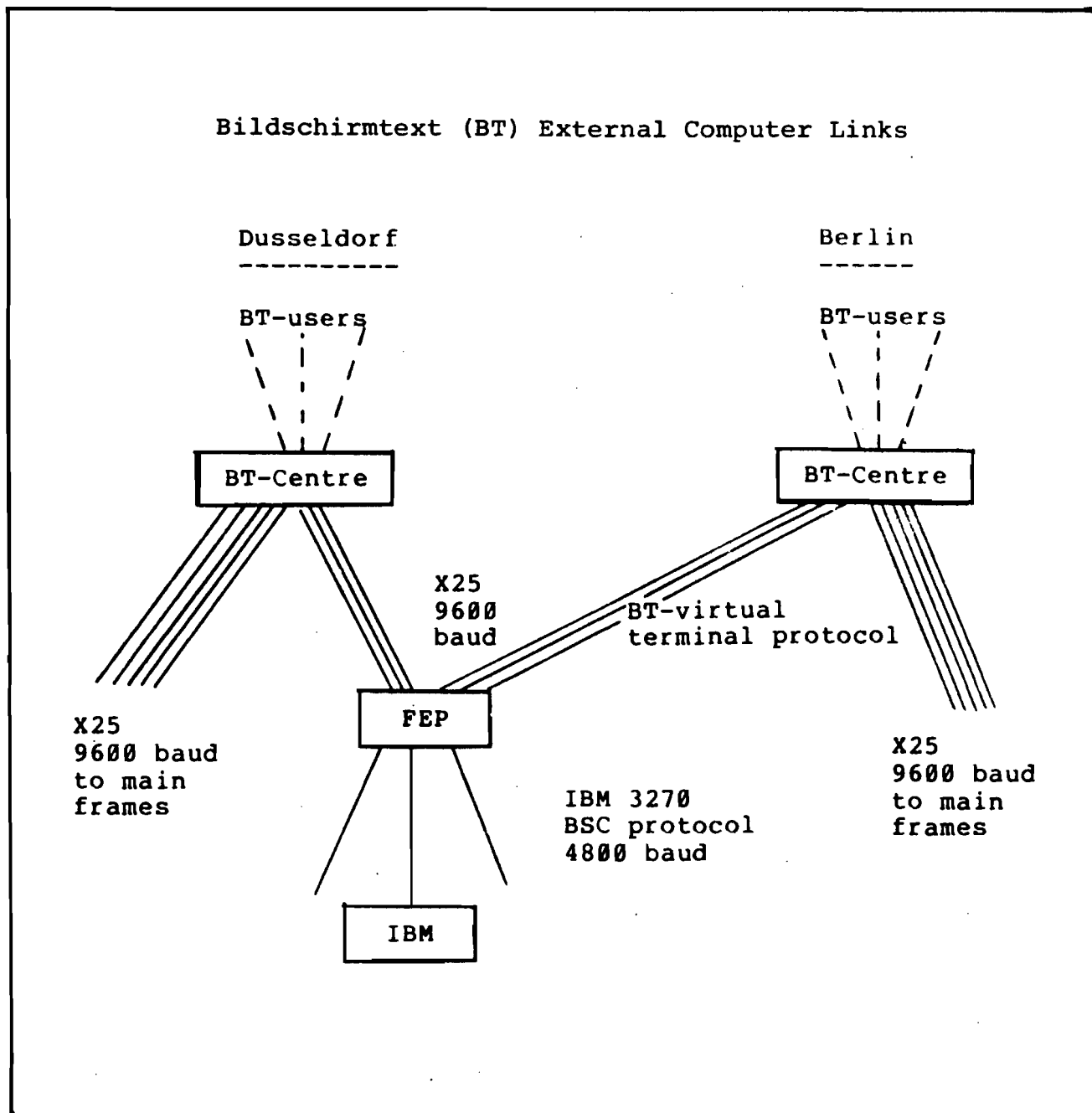
IBM 3270
BSC protocol
4800 baud

IBM

Figure 2

THE GERMAN PTT VIEWDATA CONNECTIONS

the use of additional character generators in the television sets
with Escape Switching between the basic generator and this extra
set.

Small scale systems have been developed in Sweden, Norway, Fin-
land and Spain, based on Prestel terminal standards and user-
access techniques, but not using Prestel software.   France is
planning a Viewdata service using similar, but not identical,
terminal standards, but this seems to be more oriented towards
the provision of a domestic telephone inquiry service. Canada
has developed a related but technically different system called
Telidon and is starting market trials. The principle difference
lies in a more sophisticated terminal standard requiring an
intelligent terminal capable of vectors, circles and polygons.
This is morlike a conventional computer graphics terminal and can
produce better pictures than Prestel. Whether it will be more
successful economically remains to be seen, as the set price must
be higher.   Prestel software, rewritten for DEC hardware, has
been sold to GTE in the United States for a trail service in
Florida.

IS VIEWDATA ANY GOOD FOR TRAINING?

Viewdata is an interactive service on a fast, medium-sized,
general-purpose minicomputer, but it is "non-intelligent." By
that I mean that it provides no service other than the ability to
branch to 10 other frames from the current frame. No calculation
is possible and the only input accepted is a single numeric
choice or a direct jump to a frame (* XXXX #). The database is
completely unstructured and contains amorphous blocks of text
whose only relationship is in the words of the text and the 10
choices of where to branch.

For example, there may be frames with text about "holidays,
Spain, October", but there is no way, other than visual inspec-
tion, of finding them. Nor can the database contents be modified
except by visual inspection or by complete frame replacement if
the relevant frame numbers are known. In other words, no keyword
accessing. Whether a menu of choices exists and how it is laid
out is entirely up to the editor of each frame and there need be
no consistency. There also need be no consistency of layout, use
of color, etc.

These features limit the educational use of Viewdata to pro-
grammed learning of the page turning variety only, i.e., ques-
tions can be presented in multiple choice format and the learning
paths are all predetermined -- no random or calculated variation
(for example, by scoring success) is possible. Viewdata is a
book displayed on a television screen and little else.

Nevertheless, I believe there can be valuable uses. Good design
of multiple choice paths can concentrate the students' attention
on particular subjects, whereas a thick book might be daunting,
particularly as people become more television-oriented and less
willing to read books. The use of multiple choice ·branches of
the form "this is the wrong choice because" can lead the student
back through the question in a way that is much more attractive
and educationally effective than turning backwards and forwards
in a book. The use of color and graphics (although limited) can
be used to great effect in certain kinds of block diagrams,
histograms, etc. To some extent I believe that the lack of
score-keeping can be overcome by asking students to keep their
own score on paper and branch them into remedial questions con-
centrating on particular topics.

Since all these features, and many others, can be provided on the
most elementary timesharing services or on stand-alone micro-
based systems, the principal attraction of Viewdata lies in its
national network, and the availability and (hopefully) cheapness
of the terminals. It is unlikely that anyone would buy a View-
data set just for the occasional training course, but if sets are
installed for other purposes then training becomes a serious
proposition.

Frame storage charges are high, particularly in an educational
context. One particularly irritating aspect of this is that
branching addresses are explicit. In other words, if you have 50
places in a course where you output a particular frame, you have
to store that frame 50 times because from each one you have to
define an explicit branch -- there is no "return to calling
frame" facility within the database, i.e., no "subroutining of
frames." This can add to frame storage charges unnecessarily.
So, Viewdata charges have to be examined critically in a training
context.

There are interesting peripheral developments in Viewdata which
may impact on training. The early terminals were unintelligent.
Current versions have microprocessors and can drive printers and
tape recorders. One potentially powerful development is Tele-
software. This requires an intelligent terminal with extra
memory and one or two floppy discs. Programs are loaded into
Prestel as text format object code. The user accesses the index
of the IP providing this program library service, selects the
required program, and the terminal calls down the pages of the
program from Prestel, plus any necessary pages of data, and then
disconnects the set from the telephone line and Prestel. The
educational limitations then are those imposed by the micropro-
cessor, the screen properties and the loaded software and data.
So far there has not been much development of educational uses in
this area because of lack of a suitable intelligent terminal.
Obviously, Viewdata in this context is just a transmission medium
and the terminal could as easily be loaded by other means, but it
does open up program library opportunities if the economics are

right.

A very recent development revealed by BPO is "picture Prestel" in
which a non-standard set receives frames containing a mixture of
text and coded-photograph data. The area of the screen which can
be used for this picture is limited by the amount of memory in
the terminal, and at 1200 baud the picture build up is slow, but
the picture quality is good. BPO demonstrated an excellent use
of this in examining houses-for-sale pages but there is little
likelihood of the television industry adopting another, and more
expensive, variation at this stage.

If the factors of terminal technology availability, frame storage
charges and user costs come together sensibly in a particular
training context, then Viewdata offers a possible national train-
ing network with no capital costs, operator costs, travel costs
or hotel costs. Its educational possibilities may be limited,
but perhaps as pre-course training prior to attending existing
training centers it may have some merit.

Another related application may be to use Viewdata to advertise
Digital's products and services. Use of Viewdata terminals in
the Career Guidance offices of UK Universities is growing, offer-
ing access to data structured by career type and geographical
area, and this should perhaps be considered in terms of Digital's
recruiting plans.