Chapter 10
E-Learning

Abstract  Electronic learning and teaching applications can be found in various locations falling under IPC class G09B, such as G09B5/00, G09B7/00, G09B9/00 (simulators) and G09B19/00. Applications in the field of electronic learning and teaching are often built on a basis of general purpose computers. Standard interfaces like keyboards, pointing devices, voice input and touch-sensitive displays are used for interacting with the user. The implementation of teaching concepts is often described on a very high abstract level. Applications consider the hardware infrastructure of learning systems to be known to the expert and the software is often described in functional terms without disclosing implementation details that might be of importance during the realisation of the learning system. The following examples concern electronic learning systems in the context of geography education.

10.1 Example 1: Interactive Electronic Learning Tool

10.1.1 Description

Manufacture of electronic boards with interchangeable printed covers is known. Predefined contact points are distributed over the surface of the board. The user of the learning board places a first contact probe next to a graphical representation of a learning item, e.g. the text label “France”. If he then places the second contact probe onto the correct corresponding contact point, i.e. the graphical representation of France within a map of Europe, an electronic circuit is closed and the learning device confirms the correct answer by lighting a lamp or producing a sound.

The learning content can consist of any subject as long as the association between questions and answers is unique. A great variety of such electronic boards exists in and is particularly suitable for the education of students of geography.
Due to constant changes however, geographic features like borders, state names or statistical facts are rapidly rendered obsolete.

The objective of the improved learning tool is the provision of a learning device which may be updated as and when required.

The problem is solved by the provision of a computer console, comprising at least one touch sensitive display for data input via a pen. The console may further comprise several command buttons, wired and wireless communication interfaces and a memory card slot.

An associated memory card comprises the software and up-to-date map material for running the geography e-learning quiz on the computer console.

Update kits are available on a yearly basis as replacement memory cards. In this way new games and quizzes can be provided to the learner with knowledge updates that reflect changes in the real world.

10.1.2 Claim 1

Interactive electronic geography learning tool comprising:

(a) a teaching concept for a handheld computer console consisting of a touch-sensitive display, a memory card slot, a touch-pen, a processor, a memory card comprising software and data

(b) the teaching concept and data being arranged to simulate a geography quiz

(c) wherein the quiz consists of a series of questions and answers characterised in that

(d) each question being activated by clicking with the touch-pen on one of several available question symbols

(e) each answer being given by clicking with the same touch-pen on one of a plurality of answer symbols

(f) a correct or incorrect answer resulting in corresponding graphical or audio feedback signals

(g) the quiz ending when all available questions have been answered or after a predefined time interval.

10.1.3 Examiner Observations

Despite the prominence given to them, the closest prior art learning tools for the claimed invention are not the electronic boards with interchangeable printed covers mentioned in the description, but existing game or computer consoles which are commonly known to exist and as distributed from major manufacturers.
For this example, it is to be supposed that a geography quiz is not available for this type of console. The claimed geography learning tool thus differs from the closest prior art by the learning content.

The particular way the console is operated upon during the geography quiz, i.e. the use of a touch-pen for answering questions by clicking on symbols displayed on the touch-sensitive console display, is known from other learning modules for this type of console which are also available on memory cards.

Since the description did not mention any obstacle for implementing the claimed geography quiz, it has to be assumed that a console programmer would implement the geography quiz just like any other existing quiz comprising questions and answers. Therefore a skilled person would implement the claimed learning tool without any inventive skill.

The reader might doubt that patent applications as in example 1 are really filed with patent offices, however it is the case. It is noted that the content of example 1 could realistically be part of a patent application filed in IPC G09B7/00 and that some patent systems foresee the possibility of granting patents for programs for computers even when their action relates to other matter which falls under the exclusion list of the EPC. Once past the requirement of presence of any technical character at all, the EPC has a relatively graded response to subject matter. In the US system, for example, the requirement of statutory matter is somewhat more generous in its later implications for what may be considered inventive.

In other patent systems, claim 1 nevertheless would most probably not be considered inventive over other software programs for existing game consoles.

If the applicant were to modify his claim during the examination phase to a system claim comprising all console elements mentioned in bullet (a) of claim 1, a tactic observed quite regularly during substantive examination before the EPO in a “throw the kitchen sink at it” act of desperation, it would still not be regarded as involving a inventive step.

10.2 Example 2: Internet-Based Interactive Learning System

10.2.1 Description

Interactive globes which operate in conjunction with an associated touch-pen have previously been used for entertainment and educational purposes. Known globes consist of a base part and an upper part made of a coloured sphere with maps. The base part comprises several buttons for selecting the games and quizzes to be played. A memory module stores the facts about the countries. The touch-pen allows the user to select locations on the globe. Traditional globes are faced with the problem that by the time they have been manufactured, some of the knowledge stored in the globe is already out of date.
A further problem of globes is the level of detail of areas of interest due to the uniform scale over the whole globe. Small countries or other areas of interest like cities and national parks cannot be explored with a satisfactory level of detail.

A solution as presented in the previous example consists of providing a memory module with updates. Although data stored in the globe can be updated every now and then, the memory module is nevertheless faced with the same problem of obsolete data. Replacing the data stored in the globe by updated data from a memory module is cheaper than replacing the whole globe but does not solve the problem of providing up-to-date values for globe data like population, currency and world leaders to name just a few.

The new concept for interactive globes comprises an interface, provided in the base part of the globe, by which the globe can be connected to a general purpose computer (Fig. 10.1). A software driver is provided in order to allow the automatic connection of the globe to a remote server via the general purpose computer. By virtue of connecting the interactive globe, via the computer, to an Internet server, up-to-date values for all relevant facts can be downloaded into the memory module of the interactive globe. The access to the Internet server requires an access code which is provided with the globe. This code is valid for one year. After the first year, the user can purchase a new one year subscription.

The solution to the second problem, the uniform scale over the whole globe, is solved by the provision of detailed maps. For this purpose the base part of the globe comprises a compartment that can be opened. When necessary, a flat detail map of choice can be placed onto the flat drawer surface of the compartment and used in conjunction with the touch-pen. Paper cards with representations of different geographic areas and different scales can be placed onto the flat drawer surface. RFID tags in the paper cards are read in order to determine which card has been placed onto the drawer surface. The interactive geographic learning tool thus allows the user to explore the globe as a whole on a uniform scale and chosen areas of interest with a scale such that the paper maps fit in and onto the interactive compartment of the base part of the globe.

Fig. 10.1 Interactive globe
10.2.2 **Claim 2**

Interactive geography learning system comprising:

(a) a base part having
(b) multiple buttons for selecting and playing games and quizzes
(c) an interface for connecting the base part to a general purpose computer
(d) a sphere with a touch-sensitive surface, connected in a rotatable manner to the base part
(e) a touch-pen, connected to the base part via a cable, for selecting locations on the sphere
(f) a memory module for storing the globe facts
(g) and a processor

characterised in that

(h) the interactive globe can be connected to a remote Internet server for replacing out-of-date globe facts by up-to-date values
(i) the base part comprises a compartment which can be opened and onto which interchangeable detailed maps can be placed.

10.2.3 **Examiner Observations**

The geographic learning tool differs from traditional interactive globes by features (h) and (i). However, those features do not interact to provide a synergistic effect. Therefore the features of claim 2 can, in some patent systems, be regarded as an *aggregation*, these features relate to *partial problems* which are not related in any way.

In such patent systems, it is sufficient to show a lack of inventive step for each of the individual problems and their associated features and solutions.

Let’s consider the first point, namely updating.

The concept of updating firmware or user data in a digital device is known. Such devices are shipped with a driver on a CD for connecting the device through a general purpose computer to a remote server. Once connected to the server, parts of the data stored in the device can be updated. Known examples are portable navigation devices where the user can connect the navigation device through a USB interface and a local computer to a remote server for updating the firmware of the navigation device or for downloading updated map data. The similarity of technical infrastructure and implementation should be immediately evident and it is improbable that an examiner will be contradicted on the self-evidence of this.

In the present example, the interaction between the globe on the one hand and the general purpose computer or the remote server on the other hand, does not go beyond the concept of downloading data and updating a digital device.
The provision of detailed maps in a compartment of the globe does go beyond the simple combination of known interactive globes and interactive boards. The interactive boards mainly come with two electrically conducting contact probes whereas the electronic globe only has one touch-pen, which does not have an electrically conducting tip. The use of the touch-pen, together with interactive board does therefore require a technical solution. If sufficiently disclosed, this interaction could be the basis for an inventive step. The examiner would have to seek further detail and prior art in order to raise tenable objections.

10.3 Example 3: Computer-Assisted Teaching System

10.3.1 Description

Traditional electronic globes exist in different designs. Some focus on the representation of political information, others illustrate natural landscapes like mountains, deserts, forests and grasslands. Hybrid globes are manufactured with illuminations that show, for example, political information when the light is switched off, but reveal both political and transparent natural landscape representations when the light is switched on. Independent of the type of the information represented on the electronic globe, the level of detail is limited.

A typical problem of traditional electronic globes is that of their high scale. On a football-sized globe even the United States of America is only a few centimetres wide. If a user wants to see a selected region in more detail, he has to consult an atlas. It is also difficult to point at and touch a certain area of interest. A game or quiz mode must be limited to areas of relatively generous dimensions due to the limited resolution of the contact point of a touch-pen on the interactive globe.

The aim of the present invention is the provision of an interactive geography course that allows the study of even the smallest geographic regions while preserving the pedagogic benefits of the presence and use of a real globe.

The geography course makes use of an electronic globe as presented in example 2. The tutor can teach basic concepts using a three-dimensional scale model of the earth. Games and quizzes on a wide geographic level covering continents, oceans, countries and capitals can be performed using the touch-pen associated with the globe.

For more detailed questions, the tutor switches to a computer implemented globe displayed on a general purpose computer connected to the Internet (Fig. 10.2). Such a computer could, for example, be a portable computer positioned next to the globe. Alternatively the tutor may use a projector. The information displayed by the computer globe can be adapted to the needs or interest of the tutor. It features real-time information like weather data, historic imagery consisting of images of a selected area from different points in time (showing the changes which have
occurred in an area), saved tracks from class excursions, and all of these with the option of displaying on two- and three-dimensional layers.

10.3.2 Claim 3

Computer-assisted teaching method for interactive geography courses comprising the steps of:

(a) using an interactive globe for teaching geography on a large scale
(b) the interactive globe being connectable to a remote Internet server for replacing out-of-date globe facts by up-to-date values

characterised in

(c) switching to a computer-implemented globe for detailed views of smaller regions
(d) selecting regions of interest via the computer user interface
(e) receiving map data on the computer from a remote server
(f) rendering a three-dimensional view of an area of interest
(g) displaying the resulting view on the computer display
(h) representing real-time data on graphical layers of the computer display
(i) providing an application programmer interface (API) for integrating any kind of further web-based teaching material.
10.3.3 Examiner Observations

The reader is at this point probably thinking of a combination of a traditional globe as presented in example 2 and virtual globe software now available over the Internet, such as Google Earth™.

Both teaching tools are indeed already known from the prior art. In one case the globe of example 2 may be presumed to be known, and in the other, interactive 3D globe software is very popular and has been in common circulation since, at the latest, 2005.

Claim 3 is directed however at a particular combined use of both learning tools in one course, but that does not yet result in an invention intimately related to a novel and inventive teaching method.

The combination of both tools potentially results in a cognitive learning effect for the pupils. However, the possibility of an Internet update for the physical globe data does not provide any interaction with the computer-implemented virtual globe. The teacher must build a cognitive bridge between the two globes, and thus create a virtual learning unit.

While in some patent systems the precise structure of the claimed course and the predefined uses of the tools might be sufficient to achieve patent protection, no inventive step would be acknowledged in patent offices requiring the solution of a technical problem, since the claimed combination of features would be regarded as an aggregation of known parts. Unless a surprising or unexpected technical effect were to be convincingly argued and substantiated through reliance on the disclosure as a whole, this objection would be considered a tenable reason for refusal.

10.4 Example 4: Interactive Educational Globe System

10.4.1 Description

The closest prior art is the computer assisted geography teaching course involving an interactive globe as described in example 2.

Providing interchangeable detailed maps in the base part of an interactive globe is already known. Paper cards with representations of different geographic areas and different scales can be placed onto the flat drawer surface. RFID tags in the paper cards are read in order to determine which card has been placed onto the drawer surface. Although numerous paper cards could be provided with all kind of information and zoom levels, interactive globes with Internet connections are limited to simple graphical representations.

Furthermore, globes with small monochrome LCD displays incorporated in the base part for displaying gray-scale text or images are known from toy globes.
Also known is the provision of computer-implemented electronic globes that render a three-dimensional representation of an area of interest on a computer display. Such software allows the user to zoom in or access street level views, provides for the display of real-time graphical overlay information and permits the system to interface with other computer based learning software.

The disadvantage of such a software-based virtual globe is the lack of an intuitive tactile interface and the need for a general purpose computer.

It is the aim of example 4 to provide an electronic globe with a touch-pen that comprises a real three-dimensional sphere and which allows the user to zoom in on areas of interest on an associated, mid-size, colour display (e.g. 4.3 inch) by using the touch-pen.

The solution of the above problem is thus provided in the form of an electronic globe (Fig. 10.3) that combines the advantages of the virtual and real educational globes known from the prior art.

The inventive educational globe comprises one or more wireless communication interfaces.

The globe can be used in a stand-alone mode or in a connected mode.

**Stand-alone Mode**

The additional touch sensitive display allows the user to access and have displayed detailed maps of selected areas of interest. When the user circles an area of intense and understandable interest on the globe’s surface with the touch-pen, e.g. the particularly beautiful European country Luxembourg, the touch screen shows an enlarged view of the selected area of interest. Virtual buttons allow the user to further zoom in or to overlay additional information. City maps can also be loaded. The educational globe can further be provided with the full map functionality of a portable navigation device. Furthermore games and quizzes can be initiated and played through the touch screen.

![Interactive educational globe system](image-url)
**Connected Mode**

If the educational globe is connected, e.g. via a USB connection, to a local computer which has an Internet connection active, it can also receive up-to-date information from a remote Internet server about areas of interest, shown on the touch screen of the globe or on the display of the computer. Examples are real-time weather data and real-time location dependent news (where the user can click on a region of the globe and thus see the latest news from that part of the world).

In a preferred embodiment the educational globe comprises a local area wireless interface such as Bluetooth® or WLAN (IEEE 802.11) which enables the user to wirelessly connect the educational globe to a local computer or a mobile phone in order to download real-time data, map updates or other information.

In a further preferred embodiment, the educational globe comprises a wide area wireless communication interface (e.g. third-generation [3G] mobile telecommunications technologies like UMTS [Universal Mobile Telecommunications System]) in order to similarly download further data.

In yet another preferred embodiment one or more fingers or other objects can be used instead of the touch-pen to interface with the touch-sensitive globe surface and/or on the touch-sensitive colour display.

The modular design of the educational globe allows the producer to manufacture, package and sell the globe with different functions and expansion capabilities, thereby increasing possible market penetration and future upgrade sales.

### 10.4.2 Claim 4

Interactive educational globe system comprising:

(a) a base part comprising a loudspeaker and a power supply
(b) a sphere with a touch-sensitive surface, connected to the base part such that it can freely rotate
(c) the base part further comprising:
   (c1) one or more interfaces for connecting the globe to a local or a remote computer
   (c2) a memory for storing up-to-date information or detailed map data
   (c3) a touch sensitive display arranged to show detailed maps of a region of interest or virtual context-sensitive buttons
   (c4) a wireless pen for selecting regions of interest on the globe surface or on the touch-sensitive display in the base part and for the remote control of the computer, wherein
(d) said regions are shown on the display of the general purpose computer and/or on the touch screen in the base part of the globe together with any kind of further information related to a certain area of interest.
10.4.3 Examiner Observations

The interactive educational globe of example 4 now has features which are clearly novel over the globe known from example 2 and also over those with small monochrome LCD displays.

It is assumed, for this example, that the claimed computer-assisted interactive globe does not yet exist on the market.

First of all, it has a complete micro-computer and a colour touch screen in the base part of the globe housing. Secondly, where the globe of example 2 has interchangeable paper maps, the new globe includes all the standard features of a small computer and a colour touch screen, allowing the execution of various programs and the display of electronic maps in any zoom factor, as well as questions and answers, virtual buttons and any other graphical content. Thirdly, the micro-computer has been integrated into the globe housing.

Last but not least, the new globe system also enables new forms of interaction, for example between the wireless touch-pen, the surface of the physical globe, the touch screen in the base part of the globe housing and the electronic globe on the computer respectively.

The applicant may define further features of the globe in dependent claims.

The fate of the application will now be dependent on the depth of disclosure concerning the integration of the micro-computer into the globe housing and on how the touch-pen interacts with the physical globe surface as input device for the micro-computer.

Such an application, assuming the presence of appropriate depth of disclosure and a lack of further more pertinent prior art, has a rather good chance of being granted in patent systems requiring the solution of a technical problem but also in patent systems having other requirements for inventive step.

The technical features of the claimed globe render possible the creation of interactive learning content, something which was not possible with the prior art systems.

10.5 Special Topic – Lack of Disclosure

The interactive globe of example 4 could be realised with many off the shelf components. The biggest difference between the claimed globe of example 4 and the globe of example 2 is the integration of the micro-computer with a colour touch screen.

A globe engineer would therefore be motivated to look for existing micro-computers having all of the required hardware features as well as a collection of digital maps. A possible choice might therefore be portable GPS devices.

The integration of the microcomputer (portable GPS device) into the globe would therefore require a hardware adaptation including connection between the
electronic circuitry of the globe and the USB interface of the GPS device, a software adaptation for implementing new programs on the GPS device and an adaptation of the firmware of the GPS device for allowing new forms of data input, like the reception of geographic coordinates from the touch-pen’s interaction with the globe’s surface.

The integration of a GPS device into the globe housing will pose some problems. Although connecting a portable GPS to a computer is known, as is running the portable GPS in an offline simulation mode, what is not obvious is how to control a GPS device in simulation mode with a touch-pen when it is connected via USB to some hitherto unknown electronic circuit.

One essential feature required for the integration of a portable GPS device into a globe’s housing would therefore be a hardware interface between the GPS device and the globe housing.

If this integration is not described in the application, a patent examiner at the EPO would object to lack of disclosure, because it requires more than daily routine programming of the skilled person to adapt the GPS to the inputs received from the touch-pen at the globe surface, and to implement all of the new features which would be needed to the portable GPS receiver. If however this integration is described in the application, the manufacturer of the globe and/or the portable GPS device could offer an interactive globe with a portable GPS device that works as a navigation unit on its own and as an educational tool together with the globe housing.
Patent Law for Computer Scientists
Steps to Protect Computer-Implemented Inventions
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