



X3D Digital Textbook

Kwan-Hee Yoo
Chungbuk National University, Korea

Applications

- CAD
- GIS, Earth
- Medicine
- E-Learning

Digital Textbook

- **A digital learning textbook that maximizes the convenience and effectiveness of learning by digitizing existing printed textbooks, to provide the advantages of both printed media and multimedia learning functions such as animations, 3D graphics, and audiovisuals, as well as convenience functions such as search and navigation**

Functions of Digital Textbook

Function Type	Functions
Authentication Function	User authentication (register a user name and password), Enter a user name in a DT, Login
Display Function	Displaying texts or images, Viewing by page unit(single or double page), Zooming in and out, Fitting the page to the screen, Page scrolling, Fitting to width and/or to height of a page, Indicating page thickness, page numbering, and text hiding
Input Function	Writing(Stylus writing, Save/Delete writing), Memo(Entering/Saving/Editing/Opening/Viewing/Deleting memo, Selecting memo pen color, Creation a table of memo contents, Assigning the location of a memo window, Moving/Resizing memo window), Writing notes on a page(Entering/Saving/Editing/Opening/Viewing/Deleting notes, Indicating the date and time of notes, Saving notes as an image, Saving notes as a text file, Resizing a note window), Underlining(Selecting a color/shape/thickness of the line, Saving/Editing/Deleting an underline), Highlighting(Indicating highlighting, Selecting a color/shape/thickness for highlight, Saving/Editing/Deleting highlight), Voice memo(Recording/Playing/Deleting voice memo), Textbox input(Creating a textbox, Saving/Editing/Deleting a textbox, Viewing the content of a textbox hyperlink), Box creation, Formula(Inputting/Editing/Modifying/Deleting/Viewing a formula)

Functions of Digital Textbook

Navigation function	Navigation function(Moving to a particular page in the DT by the table of contents by the table of bookmarks and tags, by previous/next buttons, and by entering page number or browsing and page turning) Bookmark(Setting a bookmark, Viewing/Moving to bookmark, Saving/Editing/Deleting bookmark, Moving to previous/next bookmark, Setting bookmark for the log-out page)
Search function	Search within a DT or among DTs(Search by a keyword or a multimedia object)
Print function	Print function (Printing a specific page/section/chapter/whole), Print memos/notes(in part or in full), Copy function(Copying a specific text or image to a word processor), Sound effects (Click sound, Error sound, Open/Close sound)
Multimedia support function	Multimedia(Viewing pictures, 3D motion graphics, animations, audiovisuals or virtual reality, Opening multimedia objects in new window), Interactive multimedia(Viewing interactive multimedia, Opening interactive multimedia objects in new window)
Learning support function	Hyperlink(Creating hyperlink, Displaying hyperlink), Dictionary/Glossary(Viewing glossary, Glossary search), Subject menu(Constructing/Viewing additional menus or a subject), Data transmission(teacher to student, to group, to class), Formative/Summative evaluations for individuals, groups, or the entire class(Viewing questions Solving problems, Viewing evaluation results and statistical data)

An Example of Digital Textbook

디지털 교과서 Build Time : 2008-03-01 14:27

목차
수업도움미
노트
검색
책갈피
교과기능

LESSON 1
How Are You ?

Look and Listen



Listen and Repeat (1)



Let's Play (1)

이름 소개하기 놀이를 해 봅시다. 137쪽 서도필용



1. How Are You ?

메모
녹음
캘러
지정
붙여오기
하이퍼링크
안내

Navigation icons: back, forward, search, volume, and other controls.

An Example of Digital Textbook

DEMO

Digital Textbook based on X3D

- **Display Functions**
 - Displaying texts or images
 - Viewing by page unit(single or double page)
 - Zooming in and out
 - Fitting the page to the screen
 - Page scrolling
 - Fitting to width and/or to height of a page
 - Indicating page thickness, page numbering, and text hiding

Digital Textbook based on X3D

- Demo of Display Functions

DEMO

Digital Textbook based on X3D

- Demo of Display Functions (single page)

```
<Group DEF='Door'>
  <Shape DEF='DoorShape'>
    <Appearance DEF='DoorApp'>
      <Material DEF='DoorMat' diffuseColor='0 .7 0' />
      <ImageTexture DEF='DoorImage' url=' "img/p67.jpg" ' />
    </Appearance>
    <IndexedFaceSet DEF='DoorGeometry' coordIndex='0 1 2 3 -1'>
      <Coordinate point='-.5 -1.125 .05 .5 -1.125 .05 .5 1.125 .05 -.5
1.125 .05 -.5 -1.125 -.05 .5 -1.125 -.05 .5 1.125 -.05 -.5 1.125 -
.05' />
      <TextureCoordinate point='0 0 1 0 1 1 0 1 0 0 1 0 1 1 0 1 1 0 .95 0
1 .95 .95 .95 1 0 .95 0 1 .95 .95 .95 1 0 .95 0 1 .95 .95 .95 1 0 .95 0
1 .95 .95 .95' />
    </IndexedFaceSet>
  </Shape>
</Group>
```

Digital Textbook based on X3D

- Demo of Display Functions (single page)

```
<Group DEF='Door'>
  <Shape DEF='DoorShape'>
    <Appearance DEF='DoorApp'>
      <Material DEF='DoorMat' diffuseColor='0 .7 0' />
      <ImageTexture DEF='DoorImage' url=' "img/p68.jpg" ' />
    </Appearance>
    <IndexedFaceSet DEF='DoorGeometry' coordIndex='0 1 2 3 -1'>
      <Coordinate point='.5 -1.125 .05 -.5 -1.125 .05 -.5 1.125 .05 .5
1.125 .05 -.5 -1.125 -.05 .5 -1.125 -.05 .5 1.125 -.05 -.5 1.125 -
.05' />
      <TextureCoordinate point='0 0 1 0 1 1 0 1 0 0 1 0 1 1 0 1 1 0 .95 0
1 .95 .95 .95 1 0 .95 0 1 .95 .95 .95 1 0 .95 0 1 .95 .95 .95 1 0 .95 0
1 .95 .95 .95' />
    </IndexedFaceSet>
  </Shape>
</Group>
```

Digital Textbook based on X3D

- Demo of Display Functions (turn the page)

```
<OrientationInterpolator DEF='MoverLeft' key='0 1' keyValue='0 1 0 0 0 1 0 -  
3.14' />
```

```
<TimeSensor DEF='TimerLeft' cycleInterval='3' />
```

```
<TimeTrigger DEF='TriggerLeft' containerField='children' />
```

```
<BooleanFilter DEF='FilterLeft' containerField='children' />
```

```
<TouchSensor DEF='TouchLeft' description='touch to activate' />
```

```
<ROUTE fromNode='TouchLeft' fromField='isActive' toNode='FilterLeft'  
toField='set_boolean' />
```

```
<ROUTE fromNode='FilterLeft' fromField='inputTrue' toNode='TriggerLeft'  
toField='set_boolean' />
```

```
<ROUTE fromNode='TriggerLeft' fromField='triggerTime' toNode='TimerLeft'  
toField='startTime' />
```

```
<ROUTE fromNode='TimerLeft' fromField='fraction_changed'  
toNode='MoverLeft' toField='set_fraction' />
```

```
<ROUTE fromNode='MoverLeft' fromField='value_changed'  
toNode='DoorLeftTransform' toField='rotation' />
```

Digital Textbook based on X3D

- **Multimedia Support Functions**
 - Multimedia (Viewing pictures, 3D motion graphics, animations, audiovisuals or visual reality, Opening multimedia objects in new window)
 - Interactive multimedia (Viewing interactive multimedia, Opening interactive multimedia objects in new window)

Digital Textbook based on X3D

- A X3D file example for supporting Multimedia Support Functions

DEMO

Digital Textbook based on X3D

- Other Functions
 - Input Functions (user interaction)
 - Move Functions
 - Search Functions
 - Print Functions
 - Learning Support Functions

Conclusion

- Full 3D Digital TextBook (X3D)

Book: A Set of Pages

PAGE: Space containing digital textbook contents (text, table, image, 2D graphics, Audio, Motion images, 3D graphics, etc)

- Functions

Turn the page: template

Note

Memo

Highlight

Hyperlink

- 
- khyoo@cbnu.ac.kr