

# Architectural Courseware - A Network Based Multimedia System for Design Education

John O. Tector  
Cecil M. Thornhill

North Carolina State University  
North Carolina State University

Architectural Courseware is an interactive system which allows for the creative access of a course-related multimedia database and the interactive manipulation of that database to enhance design education. This project began as a Teaching Initiative Project supported by the Division of Undergraduate Studies of North Carolina State University, Dr. James Anderson, Dean, and has evolved over two phases. Phase One produced an interactive prototype (see Figure 1) that explored the requirements and technology of multimedia as a support tool for undergraduate education, specifically for an architecture course in the School of Design, The History of Contemporary Architecture.

Phase One was well received by various members of the North Carolina State University: faculty members, the Dean of the School of Design, the directors of the Library and the Computing Center, the Associate Provost for Academic Computing, The Provost, and the Dean of Undergraduate Studies. The Dean of Undergraduate Studies was encouraged by the Associate Provost for University Computing to contribute matching funds for the support of Phase Two of the project. Phase Two focused on a functional implementation of a module of the interactive prototype that could be used by students in the Fall '94 semester to test the effectiveness of the courseware concept.

The development of Architectural Courseware was undertaken as a design project, not a research initiative. As designers, we were primarily focused on the transformation of the existing into the preferred, rather

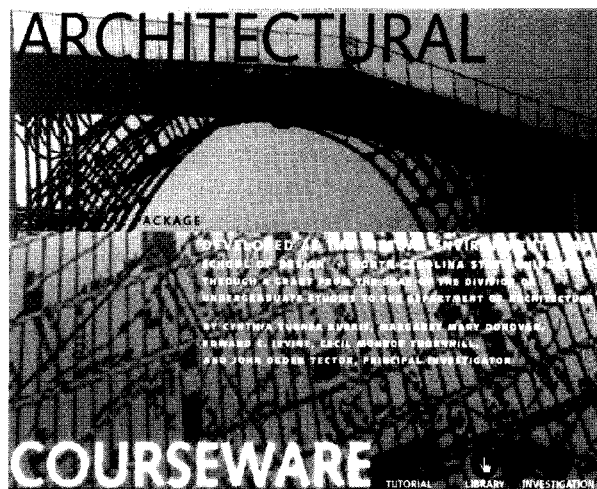
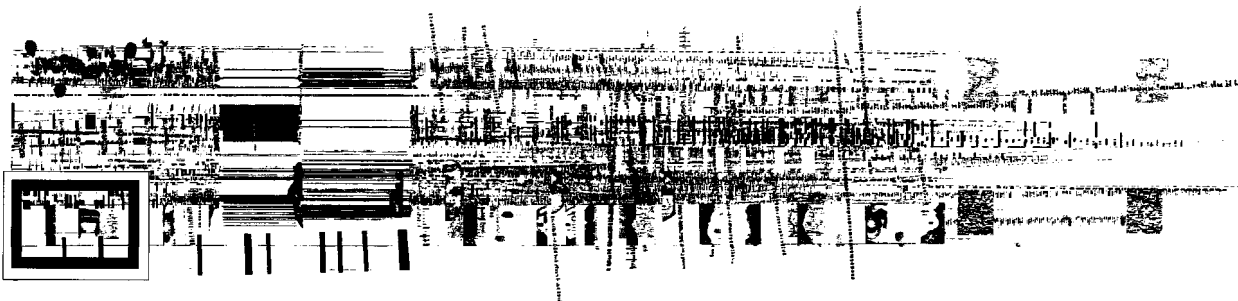


Figure 1: Architectural Courseware, an interactive prototype.

than the discovery and interpretation of the new. In this project we took the information used to support the current History of Contemporary Architecture course as source material, translated it into electronic media, and reorganized the materials into a structure that would better meet the diverse learning styles of a broad student population.

## Problem Statement

Roger Clark, FAIA, Professor of Architecture at the School of Design, and primary instructor of the course, developed a unique approach to the history of contemporary architecture. He delivers that approach



to his students through the presentation of the record of the physical structures from 1851 to the present in the form of drawings of floor plans, slides of the structures, and interpretive lectures. In the course of the semester students view more than 3200 slides, often two to four at a time, during three contact hours a week. This gives students an average of only 54 seconds of viewing time per slide per semester. The course is packed with information. However such a density encourages the memorization and recognition of slides rather than the understanding of architecture.

After evaluating the format of such an image-based lecture course, we determined that the essential task was to supplement the existing format with capabilities not presently available to students or instructors. The goal of the project was to connect the architectural images to place and time (see Figure 2), integrating contextual and supplementary information and providing new opportunities for students to interact with and transform the course material.

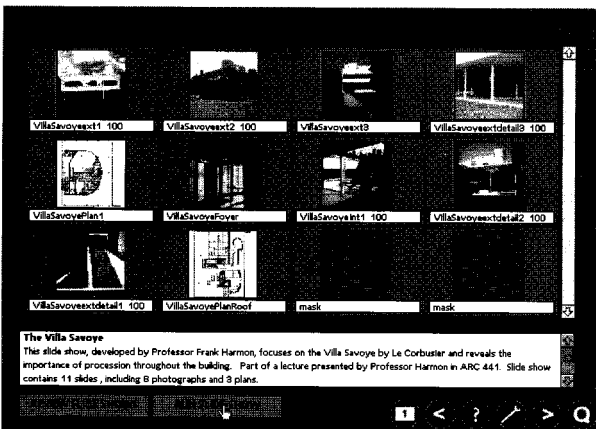


Figure 2: Interactive course material.

A major shortfall of the course is the limited direct student access to architectural images inside and outside of the class sessions. Responding to frequent requests by students for slides to be made available to them, teaching assistants offer slide review sessions before exams. Although helpful for test preparation the contribution these reviews make to long term learning can be questioned. Although making original slides available to students is impractical, there are continual requests that slides be made available for personal use.

This feedback suggests the desire for more depth and a somewhat slower pace to the information presented. In response to these issues, Phase One presented a conceptual model of a network-based image delivery system. Phase Two (see Figure 3) attempts to implement such a system for the subset of slides used during the test review process.

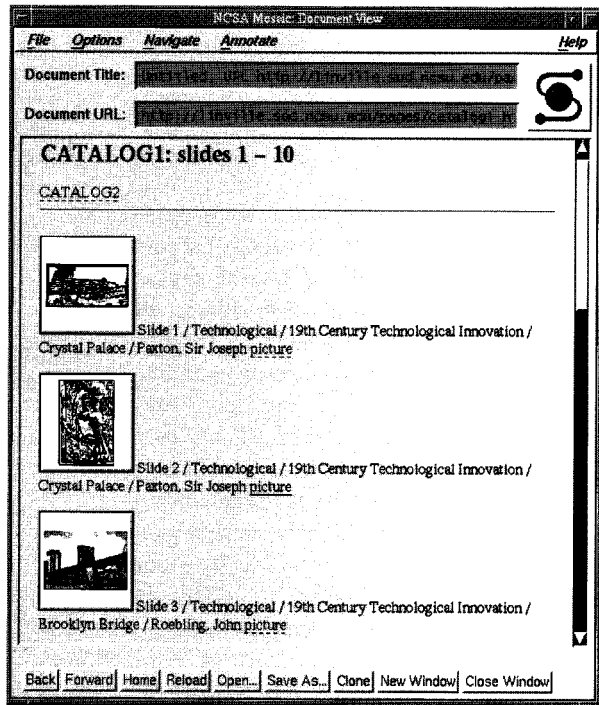
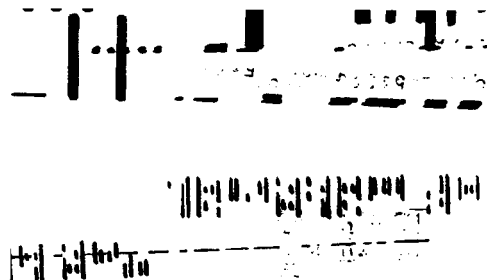


Figure 3: A network based image delivery system.

Professor Clark selected approximately 400 slides from the original set of 3200 that he felt would be most helpful to students in studying for the tests given over each section of the course. These slides, along with other printed review materials, some additional computer models, and other support information have been digitized and will be available for students to access by properly equipped computers across the campus network in Fall 1994.

Expanding the original prototype into a functional product serves the needs of a varied community of users. Students are eager to gain access to additional study materials. Library staff are interested in examining how they can begin to



incorporate new technology into their traditional roles as information providers. Instructors and school administrators are looking for ways to develop effective means to share teaching skills within and between departments. Computer support personnel need to test and demonstrate the viability of digital multimedia systems as knowledge delivery tools in education.

## Methodology

To begin the process of creating the first prototype for Architectural Courseware we researched the target course's content and methods and developed a formal matrix of design goals and possible methods of achieving them. A plan emerged that governed the prototype's development within the time and budget constraints under which we operated. To move forward with Phase Two, the creation of a functioning prototype for use in a classroom environment, we looked at existing network multimedia technologies and determined which would more closely allow us to realize the goals of the prototype given current university equipment and budgets.

With counsel from the North Carolina State University Computing Center we selected an authoring system that would allow us to create courseware elements in our own lab, store the finished product centrally, and deliver courseware materials to almost any student accessed computer on campus. The authoring system is a software package called NCSA Mosaic, an Internet information browser and World Wide Web client, developed at the National Center for Supercomputing Applications at the University of Illinois, Urbana-Champaign. Mosaic is provided free of charge to non-commercial users. It is a client-server product. The server is a UNIX system application. There are clients that operate on UNIX, Windows, and Macintosh platforms.

Mosaic presents information to the user as a document made of pages (see Figure 4). The documents are written in a language called HTML (Hypertext Mark Up Language). The elements that HTML provides describe audio, video, text, still images, and computer files. To make all of these materials available, we first digitized them on our

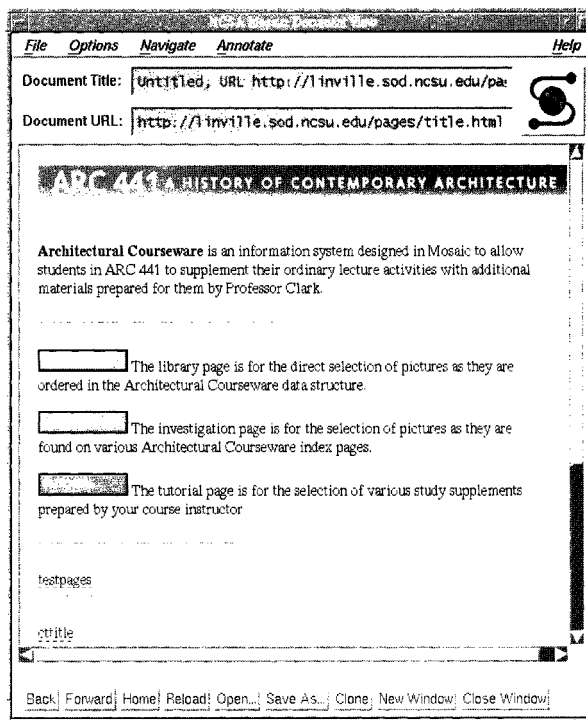


Figure 4: Courseware Menu Page

Macintosh, then transferred the computer files to a UNIX system, and then wrote HTML documents to present them to our user community.

Because it is a hypertext system, Mosaic allows the creation of rich interconnections between data items like images and text. Since every media element or piece of text can be connected to anything else through a hyperlink, it is up to the authors to impose enough order to allow students to find their way without being overwhelmed. To accomplish this we tried to collapse the taxonomy of networked pages to a simple structure (see Figure 5). The Mosaic Home Page is the entry point to the system and provides a hyperlink to the Architectural Courseware pages as well as other School of Design information. The Courseware Menu Page (see Figure 4) offers access to the three parts of the Courseware system. The Tutorial Menu provides a selection of various study supplements prepared by the instructor. The Investigation Form allows students to search the Courseware database for specific subject pages. The Catalog Menu provides access to the

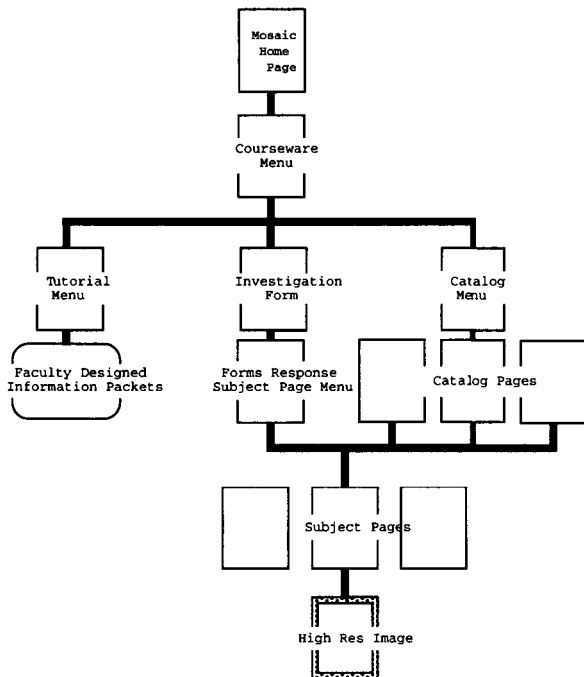


Figure 5: Courseware Menu structure.

Catalog Pages of slide icons. The Subject Pages (see Figure 6) are the repository of the information to be presented by the instructor to his students.

The challenge of the design process was to produce pages that read well on different client platforms, screen sizes, fonts, and color capabilities. The Architectural Courseware materials will be available along with reference notes and index pages on the Mosaic server. In a parallel effort, Professor Clark has received a grant to produce four Photo CD's, one for each section of the History of Contemporary Architecture course content. Each holds approximately 95 slides. Students will be able to use both systems and evaluate the performance of each as a study aid.

**Conclusion**

Currently Mosaic presents a challenge to the multimedia document author when it is necessary to deal with large numbers of similar items at the same time (e.g. hundreds of slides in a catalog, multiple index entries, etc.). This necessitates that the author possess

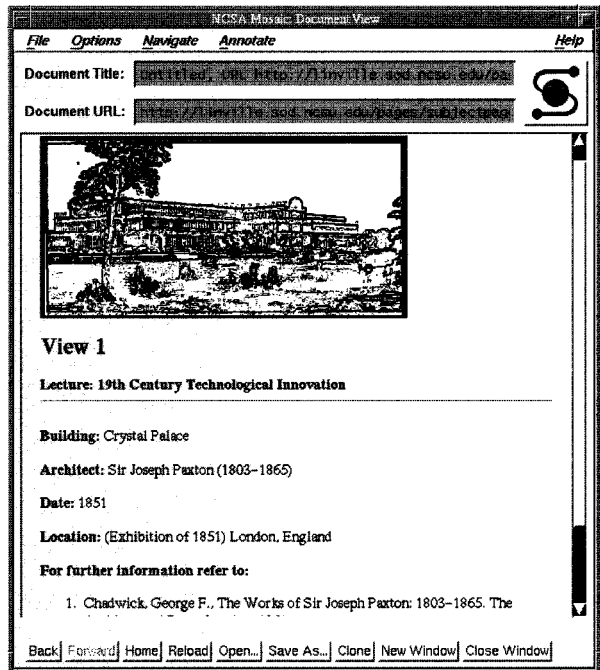
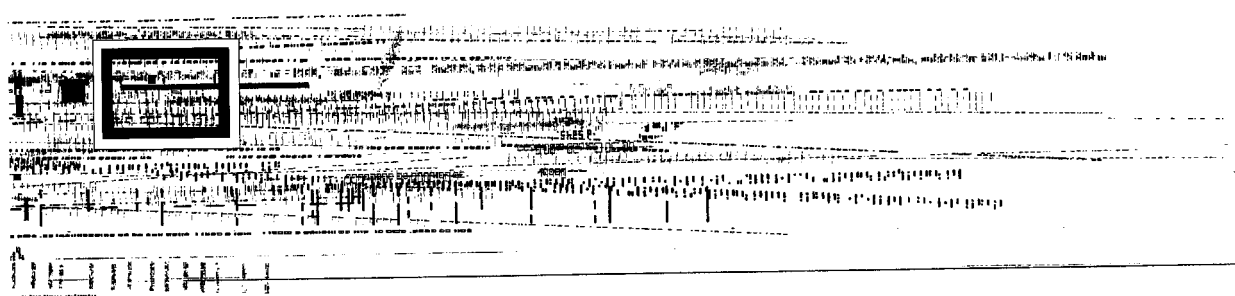


Figure 6: An example of a subject page.

both sophisticated word processing and database manipulation skills and fluency in string manipulation with algorithmic compilers.

The ease of generation of a complex set of learning goals is frustrated by syntactical limitations of the hypertext markup environment. In spite of this, as designers, we are excited by access to a new and powerful channel and we are compelled to try to learn the techniques that will be most effective in helping to structure successful messages for digital media. We recognize that the flexibility of computer-based instruction tools allow us to reach both the current student population and future populations within and without the course more effectively. We are able to deliver the same information through many different paths, each designed to support the diverse learning styles found in the student community. It is this opportunity to share standardized knowledge and scholarship in diverse forms that promises to bring the biggest benefits from projects like Architectural Courseware.





1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000