1. **Designing effective interactive multimedia learning environments for the needs of adults in post-secondary education.**
2. **The purpose of this paper is** to examine the properties of interactive multimedia learning environments that target adult learners and determine the specific needs that make the multimedia environments conducive towards learning by reviewing various literature sources.
3. **Introduction**
   a. With all the multimedia software that is being produced in the world today, what design trends are taken into consideration when determine if it is meeting the needs of adult learners in a post-secondary environment? If by examining what the design considerations are for software aimed at adult learners in a post secondary environment, more effective learning environments can be created.
   b. The analysis of this topic is important because if by examining what the design considerations are in producing of multimedia learning environments, we can find trends to help analyze the learners better, as well as develop software that target the needs of the learners.
   c. The design considerations in developing multimedia learning environments are important to help future developers design software that will meet the needs of its intended audience.
   d. This review will touch upon the topics of interactive multimedia learning environments, examine the needs of adult learners in a post-secondary education, and develop ideas to connect the two topics together.
   e. The results of this review will be used in the development of future interactive multimedia learning environments. As the design considerations have been discussed the future development will be more effective in meeting the needs of the target audience – adults in post-secondary education.
   f. This review will answer the following questions:
      i. What is an interactive multimedia learning software?
      ii. What are the needs of adult learners in post-secondary education?
      iii. How can you develop effective interactive multimedia learning environments?
      iv. How do adults in post secondary education learn?
      v. What are design considerations in developing interactive multimedia learning environments?
4. **Methodology**
   a. To locate the resources for this paper, various online databases were used such as ERIC (SilverPlatter), WilsonWeb Education Full Text, InfoTRAC. The University of Northern Iowa Rod Library was also utilized for resources. Various key-words/descriptors were used to find the information used in this paper.
      i. The descriptors/key words used for this paper were as followed: Adult education, computer assisted instruction, multimedia Instruction, computer software evaluation, multimedia materials, multimedia design, technology uses in education, postsecondary

education, computer uses in education computer assisted learning, adult learning, authoring aids programming, design-requirements, program effectiveness, instructional effectiveness, material development.

    b. The sources were selected based on past experience with the various databases.

    c. The information found for this paper was evaluated based on the quality of the content, the relevance to the topic and the year they were written.

5. **Analysis and Discussion**

    a. In this section this paper will be examining the various topics of this paper, summarize them and analyze them for their content as it pertains to this paper.

    b. *What is interactive multimedia learning software?*

        i. Multimedia is the use of various types of media like text, sounds, graphics, animations, video and images in a program ran on a computer. (1)

            1. "Video effective for setting context, modeling, motivating and illustrating concepts. Text organizes and sequences context, presents information, explanations, examples, and questions. Computer media stores the information and various computer applications that run. Network and the internet provide access to other data sources and other computers. " (1)

        ii. The technology available today can be built to allow students be autonomous in their learning through investigation and the acquisition of real life knowledge.(4)

    c. *What are the needs of adult learners in post-secondary education?*

        i. A level of redundancy to target the various ways of learning utilizing Gardner's multiple intelligences. But not so much as to distract the learner or confuse the learner (1)

        ii. Stress autonomous learning(2)

        iii. Adults succeed better through learner centered instruction (9)

        iv. The andragogical model, which focuses on learner centered instruction is the most favored way of teaching adult learners. (9)

        v. Adult learners are: Self-directed, have their life experiences to provide background to their learning experiences (9)

        vi. Adults tend to be life, task or problem-centered for their styles of learning in contrast to subject matter centered. (9)

        vii. Adult learners should feel safe yet challenged in their learning. (9)

    d. *How can you develop effective interactive multimedia learning environments?*

        i. Incorporating workbooks as a supplemental learning aid while making sure that an incorporated guide, if included fully prepares the learner to use the software. (1)

        ii. Concepts in designing with ideas based on learning from and with technology: Lifelong learning, learners will continue to grow and

develop their learning ideas b) adult learners have distinct needs and characteristics that vary from person to person c) the goals of the learning must be understood to the learner d) keep the learning within the adult perspective and frame of mind. (1)

  iii. reflection, narration, and construction are important in learning process(4)

  iv. create meaningful learning opportunities, learners should find challenge in what they are learning (5)

  v. Strive for challenging content, high learner interaction, and real world use for designing course materials (5)

  vi. Practical ideas to consider when developing meaningful experiences (5)

  vii. Interactive multimedia supports multiple modes of learning, via Gardner's multiple intelligences (6)

  viii. Utilizing the domains of cognitive, affective and psychomotor, instruction can be customized on a large scale, and made individualistic for each learner. (6)

e. *How do adults in post secondary education learn?*

  i. "Behaviors of autonomous learning: desire, resourcefulness, initiative and persistence." (2)

  ii. "The combination of various mediums (i.e. Multimedia) can have a positive effect on student's recall. Students using the hypermedia package scored higher marks on their test on recall questions compared with other groups."(3)

  iii. "For adult learning, Penton says focused information can be as important as enticing entertainment."Adults are more focused, and approach education differently," he explains. "They value their time more in terms of what they need to get out of that material quickly." (8)

  iv. too many paths to the information can be an insurmountable obstacle to new users and perhaps turn them off multimedia learning forever (8)

  v. The context is rich enough for an adult, and the interface is easy enough for a child. The depth someone goes into it depends on his own interest."(8)

  vi. adults in general turn to multimedia learning for more of their entertainment and hobbies for the ease and convenience (8)

f. *What are design considerations in developing interactive multimedia learning environments?*

  i. Designer has the responsibility to choose the correct medium for each topic idea to be taught. (1)

  ii. Keeps the navigation non-linear contrasting to a linear navigation where it has to progress step by step. (1)

  iii. Provide a glossary or other forms of support to help learners understand complex terms or ideas. (1)

iv. four major domains of autonomous learning - sociological, teaching technique, metholodological and psychological(2)

v. Starting points of instructional sequences should be experientially real to students in the sense that they can engage in personally meaningful activity/ learning. (4)

vi. Multiple ways to search through the software and locate information(4)

vii. Types of interactive software - Tutorials, hypermedia, drills, simulations, educational games, tools and open ended learning environments, tests, web based learning (7)

viii. Utilizes various learning theories various types of interactive software to engage the learner in effective learning while being efficient about the learning process. (7)

ix. Be aware of the strengths and weaknesses of the delivery system and software used to build the multimedia, as well as the software and hardware requirements for the students as well. (7)

x. Identify the types of learning - according to Gange there are 5, verbal information, intellectual skills, motor skills, attitudes and cognitive strategies. (7)

xi. Design phase produces the steps that will make the software successful by researching effective means to communicate the ideas. Match content with the needs of the learners (7)

6. **Conclusions and Recommendations**
   a. Identify and synthesize findings
   b. Systematically answer your research questions
      i. From this point the research could be expanded to examine how adults work with technology, as well as developing learning strategies that focus on work on examining the best ways to facilitate learning with adults.
      ii. Research should also be done on the similarities and differences between distance education and multimedia learning systems.

7. **References**

1. Sabatini, J. (2001). Designing multimedia learning systems for adult learners: Basic skills with a workforce emphasis. NCAL Working Paper WP00-01. March 2001.

2. Derrick, M., Carr, P. (2003) Facilitating and understanding autonomy in adult learners. New Horizons in Adult Education. V17 n2 (4-10).

3. M. Dastbaz, S.P. Kalafatis. (2003)> Can hypermedia aided learning (HAL) deliver? International Journal of Instructional Media Spring 2003 v30 i2 p149(14). (3)

4. Maarten, D, Jaap den, H, & Gravemeijer, K. (2002). Using multimedia cases for educating the primary school mathematics teacher educator: A design study. International Journal of Educational Research 37, 2002 161-178.

5. Morrison, E. (2003) Facilitating and understanding autonomy in adult leaners. New Horizons in Adult Education. V17 n2 (21-26).

6. Passerini, K, Granger, M. (2000). The learning effectiveness of instructional technologies; results from pilot studies. Proceedings of the International Academy for Information Management Annual Conference (15th, Brisbane, Australia, Dec 6-10, 2000).

7. Alessi, S., Trollip, S. (2001). Multimedia for learning: Methods and development. Needham Heights, MA. Allyn & Bacon.

8. Worthington, P. (1993).Teacher in a box: the debate over multimedia learning. PC World, Oct 1993 v11 n10 pM62 (7).

9. Imel, S. (1994) Guidelines for working with adult learners. Eric digest no. 154. Eric Clearinghouse on Adult, Career, and Vocational Education. Columbus, OH.