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THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE CURRICULUM FOR ADULT LEARNERS AT THE ADULT EDUCATION CENTER OF THE PALM BEACH COUNTY SCHOOL DISTRICT

Iwasan D. Kejawa Ed.D
University of Nebraska - Lincoln, ikejawa@mdc.edu

Carmon Weaver
Nova Southeastern University

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THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE CURRICULUM

FOR ADULT LEARNERS AT THE ADULT EDUCATION

CENTER OF THE PALM BEACH COUNTY

SCHOOL DISTRICT

Development Research

Methodology

Iwasan D. Kejawa

Palm Beach County School District

Carmon Weaver

Nova Southeastern University

A practicum report presented to Higher Education

Leadership Program in partial fulfillment of

the requirements for the degree of

Doctor of Education

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ABSTRACT OF A PRACTICUM REPORT PRESENTED TO NOVA

SOUTHEASTERN UNIVERSITY IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

DOCTOR OF EDUCATION

DEVELOPMENT OF ARTIFICIAL INTELLIGENCE CURRICULUM

by

Iwasan D. Kejawa

June, 2004

Due to social, economical, physiological and technological changes in our environment, the School District of Palm Beach County is preparing to satisfy the learning needs of the adult learners by developing Artificial Intelligence courses that will enable them to adapt to changes in their environment. This calls for the implementation of an artificial intelligence systems curriculum as one of the preparation and several measures of adult student learning.

The research question is: "What should be included in a curriculum for adult learners to acquire knowledge and to improve and transfer their knowledge?" The research question was answered by a thorough review of literature on the subject of intelligence systems.

The formative committee provided a magnitude detail and attention to the creation of the curriculum guide. Suggestions were made by the formative committee concerning the content of the artificial intelligence development curriculum guide and its implementation. The initial draft of the curriculum was review by the formative committee and a feedback was relayed to the researcher.

The summative committee effectively judged the curriculum design, and the curriculum guide was validated by the committee. It was recommended that the Artificial Intelligence Curriculum be applied only to adult learners at the Adult education center of the Palm Beach School District. It was certain that the curriculum adhered to the School District mission, that is to provide excellence and well rounded education to individual adult and displaced student.

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Chapter 1

INTRODUCTION

The Palm Beach County School District is subdivided into seven district areas. It is under the umbrella of a superintendent who supervises the entire activities of the schools and reports to the school board. Each school district area is control by an assistant superintendent that reports to the superintendent. The School board is composed of seven members among whose includes a Chairperson that presides over meetings and makes vital decisions, from district areas of the county/community.

Within the school district, there are curriculums planners and designers that devised a course of study for the entire school system, including the Adult Education Center. Mostly the Adult Education Center consist of students who are lagging behind in their studies and those who could not afford to attend regular schools. Artificial Intelligence topics are being introduced in other subjects' Curriculums but due to the lack of awareness of these topics, it is time to introduce a separate curriculum for Artificial Intelligence because it has been determined the students will need a knowledge of artificial intelligence systems to survive after they graduate from the school.

Nature of Problem

The problem is that there are various concerns over the courses presently offered by the Adult Education Center of the Palm Beach County School District in Computer Technology for adult learners. With the importance of the use of technologies in society today there is a need to elaborate on the course offerings of technology at the Adult Education Center of the school district. Since technology comprises of so many technical entities – there is presently a lack of artificial intelligence curriculum in the technology program of the center. Artificial Intelligence curriculum will be of great value to the program at the center because of the rampant use of intelligent systems by adults in the society.

At the present time, a substantial amount of training is needed in artificial intelligence because of the lack of training in the intelligent systems part of the technology courses offered at the Adult education center. According to the recent school district survey, it was noted that half of the adult population in the district does not know how to use computer intelligently and that there is a need for knowledge management.

Purpose of Study

The purpose of this study is to develop an Artificial Intelligence Curriculum for adult learners at the Adult Education Center of the School District of Palm Beach County. There is at the moment a lack of Artificial Intelligence course curriculum offered at the Adult Education Center. The development of this Artificial Intelligence curriculum will be of benefits to the success of the adult learners at the center.

Significant to the Institution

This curriculum will be of significant to the institution since it is a necessity that learners know the future trends of what they already know and what is not known to them. The institution will be able to convey the importance of acquiring, improving and transferring knowledge based on artificial intelligence curriculum.

Chapter 2

LITERATURE REVIEW

Introduction

Literature in the fields of intelligent systems and adult education and artificial intelligence and instructional technology provided guidance for developing, improving and preparing this research. General institutional literatures as well as higher education were reviewed. The key word descriptors used in the literature search include artificial intelligence, intelligent systems, instructional technologies, knowledge management and theory of adult education.

Aging As It Affects Intelligence

Intelligence can be defined in so many ways. According to Merrian (2001), from the perspective of literary observer, intelligence is often referred to as "being Smart" – that is being able to act intelligently when dealing with everyday life situations. Merrian and Caffarella (1999) further stressed that there is also another definition of intelligence that many adults may have carried with them since their elementary school days: intelligence is a specific measurement of their ability to learn. The intellectual functioning in adulthood is very

useful for educators of adults in our schools, according to Dr. Peter Mesella of the Palm Beach School District, in the monthly issue of Focus newsletter of April 2003. The concept of intelligence has really become more complex and multifaceted over the last two decades, often causing confusion as Merrian and Cafferella pointed out in their textbook, " Learning in Adulthood" (1999).

At least it can be said that there are two theoretical perspectives, according to Knowles (1980), those of information processing and psychometric tradition that has driven the study of intelligence in respect to the process orientation of Purgation and Neo-Purgation thought. The lack of intelligence development in adulthood may be well due to lack of instructional methods at the early part of their educational careers according to Ross-Gordon (2002).

Looking at various aspects of intelligent systems, a tension does exist in the field of adult education between the technical competency and informed practical action, according to Wilson and Hayes (2000), concerning the theory and experiential intuitive practice.

Does intelligence really decline with age? The responses to the question are really mixed and may be often controversial. According to Merrian and Cafferella (1999), the classic school of thought says that intelligence enters a process of irreversible decline in the adult years, others say that intelligence is relatively stable in the adult years, with substantial intellectual changes occurring only very late in life, and primarily in abilities that were less central to the individual's life experience and thus perhaps practiced. Some say that there is no decline of intelligence in adulthood until one is close to death. In fact, some intellectual functions, no matter what testing procedures are performed, seems to increase over the course of the years. The purpose of whether intelligence decline in later adulthood is not clear-cut according to Taylor and Fiddler (2000).

Knowledge Management

Representations of commonsense knowledge are very important of the intelligent systems. Representation can actually be defined as distinguishing between syntax and semantics. The syntax of representing knowledge actually specifies the symbols that may be used and the ways those symbols may be arranged, whereas the semantic of representing knowledge specifies how meaning is embodied in

the symbols and the symbol arrangements allowed by the syntax. According to Winston (2000), good representations of systems eventually support good performance. Knowledge should distinctly be represented by adult educators in a good and simple way in order to achieve good performance and for the learners to be able to assimilate the contents of systems according to Randall and Lenat (1999). The larger framework within which transformative learning theory systems fits is based on Habermas's (1971) three kinds of knowledge: instrumental, communicative(which Habermas calls pratical and emancipatory) as stated by Ross-Gordon (2002). Instructional knowledge is cause-and-effect, objective knowledge derived from scientific methodologies. The acquisition of instructional knowledge is a goal of education in the trades, technologies, and sciences. Communicative knowledge is derived through language and validated by consensus among people. The acquisition of communicative knowledge is a goal in the study artificial intelligence in regards to human relations, social and political systems, and education. Gaining emancipation knowledge can be a goal in all facets of adult education, as we criticized the role of technology, which is in itself instrumental technology, or

underlying the assumptions of the political systems, which is in itself communicative knowledge. According to Winston (2000), it is an explicit goal in life learning skills, literacy programs, women's studies courses and community action groups. The acquisition of emancipatory knowledge may actually be transformative.

Artificial Intelligence Technology in Education

The field of Artificial Intelligence (AI) and Education is indeed traditionally a technology-based focus, looking at the ways in which artificial intelligence can be used in building intelligent educational software. As Salem (2000), pointed out, Artificial Intelligence in addition can also provide an excellent methodology for learning from human experiences.

The use of Artificial Intelligence software agents within the computer mediated learning environment has become an important focus of research and development in artificial intelligence and educational context, Dowling (2002). The development of instructional method in artificial intelligence is very important in order to further strengthening the awareness of the subject. The field of Artificial Intelligence in education has become the most challenging area in the last several years. It

actually includes the disciplines: cognitive and social psychology, artificial intelligence, computer science, empirical psychology, software engineering and education. According to Salem (2000), the goal of Artificial Intelligence is to deliver computer-based systems (or knowledge-based software) which can be used in real teaching, learning and training situations. Salem (2000) further stressed that there are two main parts in Artificial Intelligence software (or any educational-based AI software), which are a knowledge base and an inferencing system. The knowledge-based is made up of facts, concepts, theories, procedures and relationships representing real world knowledge about objects, places, events, people, etc. The inference system or thinking mechanism is a method of using the knowledge base, that is, reasoning with it to solve problems according to Salem (2000).

The field of reasoning is very important for the development of Artificial Intelligence-based educational software. The topic dealing with case-based reasoning receives a great deal of attention with the Artificial Intelligence in education community. Case-based reason is a general paradigm for reasoning from experience. It, according to Salem (2000), assumes a memory model for

representing, indexing and organizing past cases and
process model for retrieving and modifying old cases and
assimilating new ones. Case-based reasoning has already
been applied in a number of application areas, such as
legal reasoning, dispute mediation and customer support.
They have been CBR systems built in education – one of such
is the Schank's ASK systems (Ferguson, et al., 1992) which
took on the role of expert and guide a user dialog in which
system tells stories to make its points. Others include the
Design Muse authoring tool (Domeshek, et al., 1994), which
is used in classes as well to build useful case libraries
for engineering classes and to give students the
opportunity to learn more about some area by preparing and
indexing well articulated cases. There is also the CBTS
(Salem, 1997) that is used for automatic generation of
educational web pages for teaching sea creatures.

Summary

It can be reiterated that intelligence is surely the
ability to acquire and apply knowledge. But is it the
ability to perceive and manipulate things in the physical
world? Indeed these abilities are part of what intelligence
is. Artificial Intelligence surely excites people who want
to uncover principles that all intelligent information

processor must exploit, not just those made of wet neural tissue instead of dry electronics. Consequently, there is neither an obsession with mimicking human intelligence nor prejudice against using methods that seem to involve human intelligence. Just as psychological knowledge about human information processing can help make computer intelligent, theories derived purely with computers in mind often suggest possibilities about methods to educate people better according to Winston (2000). To be said another way, the methodology involved in making smart programs may transfer to making smart people.

Relationships to Course

This practicum is significantly related to the Theory and Method of Adult Education because it is related to building and improving knowledge and its uses. The Theory and Method of Adult Education comprises of artificial intelligence which is a combination of all facets of living. The adult learners must be made aware of Artificial Intelligence Systems. According to Winston, (2001), artificial intelligence systems is being used in education, agriculture, horticulture, engineering, medicine, management, just to name a few; there are so many researches under way that preclude that knowledge may be

represented by artificial intelligence systems. Thus, Winston (2001) has recommended that a curriculum of this kind would be beneficial to an institution of learning, since one has to understand what constitute knowledge in terms of theory, methods, philosophy and utilization.

Research Question.

The research question is what should be included in a curriculum for adult learners to acquire knowledge and to improve and transfer their knowledge?

Definition of Terms

Artificial Intelligence: The representation of knowledge by living things, especially by humans. Knowledge and artifacts may be considered artificial because they originate from learning.

Knowledge: Knowledge is what is known and understood in a way. It is also the ability to improve what already existed or known.

Adult Learner: Adult learner is an individual who has attained puberty and who is willing to learn new ideas for surviving in the society.

Adult education center: It is a center devoted to teaching displaced adult students who are failing or who has failed the high school diploma examination or who which to continue their education but do not want to attend college.

Chapter 3

METHODOLOGY AND PROCEDURES

Methodology

For this research, the development problem-solving was

used. This methodology was appropriate for this practicum

because the development process used in this study resulted

in program that met the needs of the identified problem,

learner and institution. It was mandatory for the

researcher to understand all the element of the development

methodology in order to be successful in this project.

Procedures

Nine procedures were used to complete this practicum.

There was a thorough planning of the creation of the

curriculum. The procedures needed to yield a successful

completion of this research are enumerated as follows:

First, a review of literature was explored by using

the terms: Artificial Intelligence in education,

Intelligent Systems, Instructional Technologies, Knowledge

Management, and Theory of Adult Education. Once sufficient

reference material has been identified and abstract

reviewed, libraries were visited and relevant copies were

made. The review was conducted to obtain as much

information as possible, to review similar studies and

their results pertaining to the foundation and uses of artificial intelligent in order to establish foundation for the study.

Second, a formative committee was established to provide input during the development of the criteria for the content of the curriculum. The committee viewed all the possibilities of initial creation of the fundamentals of the curriculum. The formative committee consisted of two teachers, a principal and a team leader that at can provide the best input during the development of the criteria.

Third, the summative committee members were selected and contacted. The summative committee was formed to validate the content of the development criteria. This committee comprised of two Technology teachers, Curriculum Evaluation Director, and Artificial Intelligence Expert. The summative committee convened on two occasions to determine the validity of the curriculum. First, the summative committee is to recommend necessary changes for the design of the curriculum, and second, to approve the design of the curriculum.

Fourth, the researcher developed a draft of the criteria to be used in developing the curriculum. The criteria included the information gathered from the

literature review and through analysis and comparison of the other school orientation and curriculum development programs.

Fifth, a draft of the criteria was provided to the formative committee for their review, input and comments. Recommendations and comments from the formative committee were collected in writing, and were used to modify the criteria. A formative evaluation was conducted for the instructional unit.

Sixth, the modified criteria were provided to the summative committee for review and input purposes. Their comments and recommendations were collected in writing, and were used to finalize the criteria for the development of the curriculum.

The curriculum was revised based on the results of the summative evaluations. The purposes of the evaluation were to determine through consultation with the evaluators, the adult learners and the teachers. There were evaluation questions such as:

- After receiving instructions, can the students identify the uses and goals of Artificial Intelligence and Expert Systems?

- What exercises in the curriculum or unit do students find most understandable and least understandable?

- Does the instructional unit (Curriculum) meet the needs of the adult learners?

- Does the instruction satisfy learners' expectations?

- Do learners perceive the diagram to be helpful?

- Are learners satisfied with the resources provided to them?

All of these questions were considered thoroughly for the evaluation of the curriculum.

Seventh, based on the review of literature by the committees, the researcher prepared a draft of the curriculum. The draft contained objectives, an explanation of the content, and procedure for applying the content.

Eighth, a draft of the curriculum was provided to summative committee for validation. A summative evaluation was conducted for the curriculum. The effectiveness of the learner or trainee learning was considered. The efficiency of the adult learner or trainee learning was put into considerations. There was consideration of the cost of the program development and continue expense in relation to the effectiveness and efficiency. The attitudes and reactions to instruction by learner and other teachers were considered. The long term benefits of the instructional program were weighed carefully. It was determined that the

assessments of the affective outcomes will establish

gathering reactions from both the adult learners and

instructional staff, as they look back on the program just

completed. There are three areas of reactions that were

given attentions to in this process: Opinions, Interest and

Attitude. The Comments and recommendations from this

committee were collected, in writing, and were used to

modify and finalize the development of the curriculum.

Ninth, the researcher provided the final copy of the

curriculum plan to the school principal and the

superintendent for their review. An appropriate time and

place was arranged for the school board members to

examine the curriculum plan. A copy of the curriculum plan

has been included in the appendix of the practicum report.

Assumptions

For this development practicum, it was assumed that the

members of the formative and summative committee are

competent and have thorough knowledge necessary to validate

the artificial curriculum. It was also assumed that the

students have a preliminary or little knowledge of

technology and are able to make inferences from scenarios.

Limitations

The curriculum will only be used within the Adult

Education Center of the School District of Palm Beach

County. The study will identify only the training needs

that exist at the time the curriculum is developed.

Chapter 4

RESULTS

As a result of exploring the literature review and
conducting formative and summative committees, a curriculum
on the applications of artificial intelligence and expert
systems was developed. This educational instructional
curriculum is melt for adult learner instructions on the
subject of Artificial Intelligence and Expert Systems.
Through literatures, it has been determined that the
subjects of Artificial Intelligence Systems and Expert
Systems are emerging innovative systems in the world of
today.

Assessments of the Curriculum

Many procedures were used to complete this development
practicum. First a review of information regarding
artificial intelligence and expert systems for adult
education was conducted. The review consisted of surveying
artificial intelligence, adult education and computer
sciences literature in education. Analysis of the available
literature indicated that there is a lack of knowledge of
artificial intelligence subject by the adult learners. It
also indicated that the subject of artificial intelligence
is an emerging subject in the academic world.

Formative and summative committees were formed to assist in the development and validation of the artificial intelligence development curriculum. Committee members were chosen based on expertise, interest and qualifications. The committee members were telephoned and send a memorandum to discuss their interest and participation, and to explain the practicum process. General questions were answered and the practicum process was further clarified along with the roles expected of each member. Individual contacted for the study agreed to participate. The formative committee consisted of two teachers, the principal, and the team leader. A complete listing of formative committee and why they were asked to participate in the assessment of the curriculum is included in Appendix A of this practicum report. The summative committee consisted of two Technology teachers, Curriculum Evaluation Director and Artificial Intelligence Expert. A complete listing of the summative committee members and why they were asked to participate in the development is included in the Appendix B of this practicum report.

Criteria were established for the development of the Artificial Intelligence Systems. Criteria were based on the information from the review of literature and input from the formative committee. The criteria selected were focused

on the development of an Artificial Intelligence Curriculum with clear and appropriate objectives, material and information concerning acquiring knowledge and learning activities appropriate for student development.

   A draft of the criteria was submitted to the formative committee on a form analyzing the criteria for the curriculum. The formative committee provided a feedback in a written form as to whether to include or not to include potential criteria and as to whether to assign priority value to each of the criteria on the specified form (see Appendix C). All the committee members agreed to give a priority value of five to the selected criteria. The feedback from the formative committee was used to develop a draft of the criteria on the form (see Appendix D) that was eventually used to evaluate the development of the Artificial Intelligence Curriculum. The criteria and the forms were then submitted to the formative committee. The formative gave an approval of the criteria.

   The draft of the criteria and feedback approved by the formative committee was submitted to the summative committee for its review and feedback. Every member of the summative committee was contacted by telephone to discuss feedback and to be informed of the iterative review process for validating the criteria.

A draft of the Artificial Intelligence Curriculum was developed. The draft included the objectives, the content and suggestions for learning activities. The draft was submitted to the formative committee with an attached memorandum explaining the iterative review process and feedback process (see Appendix E). The formative committee was demanded to provide written feedback using the established criteria and evaluation form (see Appendix D).

Responses and recommendations documented on the feedback forms (see Appendix D) were used to revise the draft. The revised draft was submitted to the formative committee and validated without further changes.

The revised draft endorsed by the formative committee was review by the summative committee for validation purposes using the formerly established criteria. The committee was given the same memorandum for explaining the review process (see Appendix E) that was tendered to the formative committee and the criteria evaluation feedback form (see Appendix D).

The summative committee evaluated the curriculum draft for compliance with the stated criteria: 1) objectives are clear and well stated; 2) objectives reflect current learning needs of the adult learners; 3) material and information included are technically correct; 4) objectives

can be accomplished through presented material; 5) learning activities are appropriate for the artificial intelligence curriculum, and learning activities will accomplish the established goals.

The final product, "Artificial Intelligence Curriculum: The application of Artificial Intelligence and Expert Systems" was submitted to the Principal and the Superintended with the recommendation to implement the curriculum. A copy of the curriculum is included as an appendix to this report (see Appendix F).

Partial Content of the Curriculum

Goals of the Instructional Unit

The general purpose of this curriculum is to enable the adult learners to recognize the uses and the approach of Artificial Intelligence and Expert Systems in the world today. It is to gear the learners toward understanding what is really meant by Artificial Intelligence and its uses in our society. Learners will be able to be conversant with the applications of intelligence and expert systems. It has been determined that Artificial Intelligence and Expert Systems are vital topics to be explored in today's world of Science and Technology according to Winston (2002). The issues to be able to recognize the applications of Artificial Intelligence need to be addressed.

There arises the question of: Do we really need to make machines/computers smarter? I think that it seems so; because as the world grows more complex, we must use our energy, food, and human resources wisely, and we must have high-quality help from machines/computers to it successfully. Machines/computers must help not only by doing ordinary computing but also by doing computing that exhibits intelligence.

One central goal of artificial intelligence and expert systems is to make machines/computer useful. Another goal of artificial intelligence which we must always remember is to understand the principles that make intelligence possible.

Learning and Teaching Styles

There are so many different styles of learning and teaching a subject. One the best style is that of Kolb's theory in an educational setting. An example of Kolb's theory of learning and teaching in an educational setting is where the learners engage actively in a laboratory work. A laboratory is set up where knowledge is put into practice. The processes of assignments or works are observed and reflected upon in a practical manner. Another example is the internship program adopted by various schools, universities and colleges. Learners are able to

bring to the classrooms, experiences from the work place

and to the work place, experiences from the classrooms.

These methods of learning evenly provide cognitive learning

styles. Testing is a way we can also relate to Kolb's

learning theory. It is a way to measure what has been

learnt by experience. Experience may be through studies or

participating in actual activity. In an actual sense,

testing is an experience because the learners get to

express themselves and diverge and assimilate what has been

learnt.

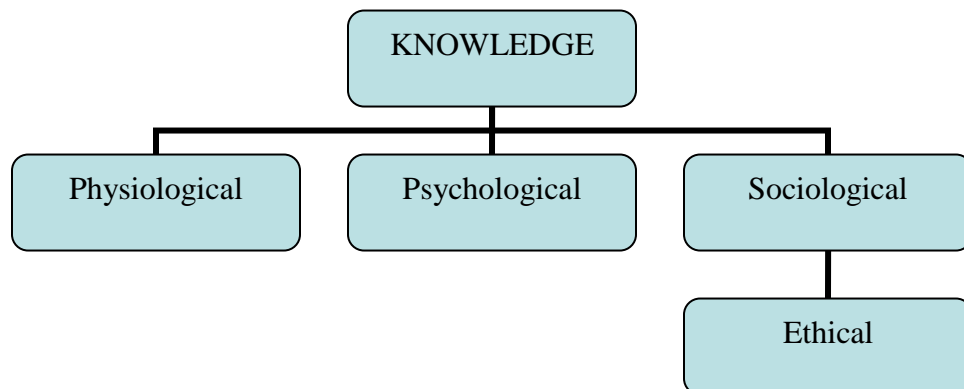<u>Representation of Learning/Teaching Theory</u>

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                      ┌─────────────┐
                      │  KNOWLEDGE  │
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Fig. 1:   The Learning/Teaching Modalities

Application of Kolb's Theory to Artificial

Intelligence Instructions

The Kolb's theory of learning and teaching is practically and adeptly applied to the artificial intelligence and expert systems instruction. Adult learners of the subject, Artificial Intelligence and Expert Systems, are obliged to actual experience of the practical notions of the subject. Concepts and generalization of the topics must be made visible and adaptable so the adult learners can reflect, diverge, assimilate and accommodate the learned process.

The adult learner analysis and contextual analysis must be viewed easily as identifying constraints to learning and teaching. Experiences of the subject are to be attained through repetitive practice of the learned process. Divergence and convergence of concepts are mandatory consequences of learning the Artificial Intelligence subject.

Chapter 5

 DISCUSSIONS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIOS

Discussions

   Learning serves as means of making things happen. Learning enterprise is a mode of which individual survived in an intelligent society according to Winston (2000). Accumulation of wealth may have to depend on the knowledge and experience in the society, learning and success inevitably juxtaposed the amenities of wealth. The essence of educational training in artificial intelligence and expert systems are the preparedness of individual to stability and success. It must be addressed to the problematic situations of individual in an intelligent society.

      The circumstances surrounding propagation of learning is not solely materialism, but on the gratitude of knowledge according to Knwoles (1980). The standard which knowledge and materialism is attained is repertoire of educational establishments. In rationalizing the commonwealth of training individual, society may have to institute transformation and sustainability in the evolution of artificial intelligence. The extenuation of objectives may depend on current and past activities or learnings. The educational solitudes of artificial

intelligence and expert systems may result in self actualization of goals and thereby create self awareness.

The technicality of learning may be justified by the scope of activities in the study of artificial intelligence and expert systems. Education of the literates may be different from that of illiterates in the society. Literacy does not mean everything is known, there are lessons to be learn from everyday activities in the society. Illiteracy of the mind is tolerable in certain aspect of learning as stated by Winston (2000).

The integration of learning may depend on the theme that individual need to know the anthology of surviving. Stability projects the purpose of learning new ideas in our world. The determination of success rests on stability and knowledge according to Massella (2003).

Education of the mind is congenial to the cognitive approach of learning environment according to Ross-Gordon (2002). It is believe that constant attention to the mind may gear up the learning process. Educating the mind is a process whereby all activities are concentrated on the purpose of achieving positive results as stressed by Merrian and Caffarella (1999). All adult learners may have to yield to proliferation of the audacity to learn new

ideas to attain success in the applications of intelligent systems.

The possibilities of learning new methods of education in adulthood or during adolescent may not necessarily have to be the same; adult learners may have to try various modes of educational endeavors. Today, many institutions are trying to explore new ways to prepare adults for unexpected situations in their everyday learning trends.

Conclusions

It can be concluded that the Artificial Intelligence Curriculum instruction is completely a curriculum that would be beneficial to adult learners at adult education center of the Palm Beach School District. Through the applications of intelligent systems to various subjects, adult learners would be able to acquire and improve knowledge, and also be able to transfer their knowledge.

The teaching of artificial intelligence systems is basically the analysis of knowledge acquiring fundamentals of humans or living things and machines. According to Merian and Caffarella (2002), artificial intelligence is portrayed as "being smart" and being able to transfer knowledge to machines and other living things or being able to make machines act as humans.

The Artificial Intelligence Instructional Curriculum was designed based on the Kolb's theory of learning and instructional delivery. The application of artificial intelligence is said to be expanding at very fast pace in our society today according to Winston (2000). The knowledge possessed by the adult learners could be transferred to other humans or living things and machines through learning, teaching or dissemination of information and adaptations of both deductive and inductive reasons.

The Artificial Intelligence Curriculum was structured to accommodate lectures, discussions and laboratory instructions. The research question of this study was justified by the design and development of the Artificial Intelligence Curriculum. The research question was "What should be included in a curriculum for adult learners to acquire knowledge and to improve and transfer their knowledge. This research question was overwhelmingly answered by the study through the review of literature and the curriculum assessments by the formative and summative committees. The curriculum placed a coherent emphasis on the applications of intelligence systems in education and in the society as a whole.

Implications

The development of the Artificial Intelligence Curriculum will positively impact the effectiveness of the adult learners at Adult Education Center of the Palm Beach School District. The lack of artificial intelligence systems training presents various concerns. One issue is the problem that could arise if adult learners could not demonstrate sufficient knowledge of intelligence systems after undergoing the rigorous training of the application of artificial intelligence systems.

It does not necessarily mean that all adult learners will be able to transfer knowledge or acquire knowledge immediately after administering this curriculum. They may actually have to practice the theoretical applications of the systems in the curriculum. Furthermore, it is up to individual adult learner of the program to demonstrate competency in intelligence systems.

Recommendations

It is recommended that the Artificial Intelligence Curriculum extensively be applied to the adult learners at the Adult education center of the Palm Beach School District. The implementation of the Artificial Intelligence Curriculum will actually justify the mission of the Adult

education center which is to provide excellence and well rounded education to individual adult and displaced student.

The students or the adult learners must have had experiences in technology or taking at least one technology or science subject be enrolling in the Artificial Intelligence course. It is recommended by the researcher that the students or adult learners taking this subject pay a visit to an establishment where artificial intelligence is greatly practiced, especially Automobile assembly plants or Hospitals, since these visits will provide insights to the uses of artificial intelligence. It is also recommended that adult learners who had not taken any science or technology courses before or no experiences, combine the Artificial Intelligence course with a Science or Technology subject.

The ideology of the artificial intelligence systems rests solely on the fact that "Knowledge comes from learning and learning comes from trying." It is absolutely possible for humans to transfer knowledge to machine as they transfer knowledge to other humans and living things.

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APPENDIXES

Appendix A

<u>Formative Committee Members</u>

Instructional Faculty Staff (Mathematics)

Qualifications: specialist degree in education, master's degree in Mathematics, several years of experience in teaching study and mathematical skills at the secondary and higher education level, responsible for coordinating the mathematical section of the FCAT examinations.

Reasons for formative committee selection: extensive mathematical teaching experience, thorough and detail-oriented professional, expressed support for the project and a desire to get involved.

Method to be used for formative selection: telephone contact to discuss the intent of the curriculum and the concept of the developmental practicum, will be provided with the copy of the practicum proposal.

Instructional Faculty Staff (Biological Science)

Qualifications: doctorate degree in Biology (Human Development), master's degree in education, chairperson of the General Science department.

Reasons for formative committee selection: extensive experience in human developmental analysis, and feasibility studies, former school board academic instruction member,

extensive knowledge in developing human artificial parts and in developing and conducting programs.

Method to be used for formative committee selection: telephone contact to discuss the intent of the curriculum and the concept of the development practicum, will be provided with the copy of the practicum proposal.

School Principal

Qualifications: doctoral degree in education, master's degree in educational leadership, assistant professor of education.

Reasons for formative committee selection: extensive experience in faculty management, enthusiasm and support for the development of the artificial intelligence curriculum, experience in assessment and program development.

Method to be used for formative committee selection: telephone contact to discuss the intent of the curriculum and the concept of the developmental practicum, will be provided with the copy of the practicum proposal.

Faculty Team Leader

Qualifications: doctoral degree in leadership education, master's degree in education.

Reasons for formative committee selection: extensive experience in developing instructional plans, coordinating educational services and conducting programs for higher education.

Method to be used for formative committee selection: telephone contact to discuss the intent of the curriculum and the concept of the development practicum, will be provided with the copy of the practicum proposal.

Appendix B

Summative Committee Members

Computer Science Teacher

Qualifications: doctoral degree in computer science, over 15 years as a technology teacher.

Reasons for summative committee selection: excellent practical knowledge of intelligence systems, member of the American computing machinery.

Method of to be used for summative committee: telephone contact to discuss intent of the curriculum and the concept of the development practicum, will be provided with the copy of the practicum proposal.

Mathematics and Engineering Teacher

Qualifications: doctoral degree in Engineering, master's degree in computer sciences, over 20 years of college level teaching experience.

Reason for summative committee selection: exceptional attention to detail and editing skills, excellent experience making modifications and accommodations in science labs, high level enthusiasm for any project that result in student development and intelligence.

Method to be used for summative committee selection: telephone contact to discuss the intent of the curriculum and the concept of the development practicum, will be provided with the copy of the practicum proposal.

Curriculum Evaluation Director

Qualifications: doctoral degree in education, master's degree in curriculum planning, over 25 years of experience in education.

Reasons for summative committee selection: extensive experience in curriculum and instructions planning, enthusiasm and support for the development of the curriculum, extensive experience in assessment and program development.

Method to be used for summative committee selection: telephone contact to discuss the intent of the curriculum and the concept of the developmental practicum, will be provided with the copy of the practicum proposal.

Artificial Intelligence Expert

Qualifications: doctoral degree in computer science, master's degree engineering, master's degree in education, Dean of the computer science and mathematics department.

Reasons for summative committee selection: extensive experience in the field of artificial intelligence systems, has conducted various researches in intelligence systems,

excellent experience making modifications and

accommodations in science labs and high level of enthusiasm

for any project of artificial intelligence applications.

Method to be used for summative committee selection:

telephone contact to discuss the intent of the curriculum

and the concept of the developmental practicum, will be

provided with the copy of the practicum proposal.

Appendix C

Feedback form

Formative Committee

Establishing Criteria for Artificial Curriculum Development

Please indicate by checking the appropriate column whether the following criteria should be used in the development of artificial intelligence systems for adult learners. Additionally, with those items that you specified "include" assign a priority of mark with "5" being the highest priority and "1" being the lowest priority.

	Do Not Include	Included	Priority Level
1) Objectives are clear and well stated.			
2) Objectives are appropriate for artificial intelligence curriculum.			
3) Objectives reflect the needs of adult learners.			
4) Material and information included is technically correct.			
5) Materials presented reflect written objectives.			
6) Learning activities are appropriate for curriculum development.			
7) Learning activities will accomplish established goals.			
8) Practical knowledge will meet adult learner goals.			

Please list other criteria that should or could be used in the development of Artificial Intelligence Curriculum for adult learners.

Name:_____ Date:_____

Appendix D

<u>Feedback Form</u>

<u>Formative/Summative Committee</u>

<u>Criteria for Evaluating the Artificial Intelligence</u>

<u>Curriculum</u>

Please evaluate the attached draft of the artificial

Intelligence Curriculum utilizing the listed criteria.

1. Objectives are clear and well stated.   Yes   No

    Comments:

2. Objectives reflect current needs of learners. Yes   No

    Comments:

   3   Material and information included are

    technically correct.   Yes   No

    Comments:

4. Objectives can be realized through

   presented material.   Yes   No

       Comments:

5. Learning activities are appropriate for

   adult learners class.   Yes   No

       Comments:

6. Learning activities will accomplish

   established goals or research questions.   Yes   No

       Comments:

Appendix E

Formative/Summative Committees Memorandum

TO: Formative and Summative Committee Members

FROM: Iwasan D. Kejawa

RE: Draft copy of the Artificial Intelligence

          Curriculum for Adult Learners

Please find enclosed the draft of the artificial

intelligence curriculum for adult learners. The draft

contains objectives and the contents: topics to be covered

in the classes. Also enclosed is the feedback form which

contains the criteria by which you will be evaluating the

development of the curriculum.

An iterative review/modification process will be used to

provide feedback for improving the curriculum. Please

utilize the enclosed form of criteria to provide feedback

to me regarding the draft of the curriculum. I will be

reading your feedback and revising the draft of the

curriculum based on your comments. The revised draft will

be sent back to you for your additional comments. We will

continue this review process until we are satisfied that

the curriculum meet the stated criteria.

My sincere thanks to all of you for the interest you have
shown on this project. I am well aware of your busy
schedules and appreciate your support for this project.
Please feel free to contact me. Please complete the
feedback form and return to me at your earliest convenient
time. You can mail the completed form to 147 Kapok
Crescent, Royal Palm Beach, Fl 33411, fax 791 – 7491 or
return through campus mail (PONY). Please do not hesitate
to call me at 561 -795 -5958 if you have any questions.

Appendix F

<u>The Artificial Intelligence Curriculum</u>

Objectives

Upon completion of the course or administering this

Curriculum, learners will be able to demonstrate the

following competencies.

1. Be able to think and solve problems

    Independently well.

2. Be able to used technological equipments in

    performing various tasks.

3. Be able to acquire knowledge and transfer

    knowledge to certain entities.

4. Learners will be conversant or be aware of

    various applications of artificial intelligence.

Duration

Time: 5:00 p.m - 7:00 p.m

Day: Every Wednesday

Term: Fall/Winter/Summer

Textbook

Artificial Intelligence (Third Edition)

    By Patrick Henry Winston

Teaching Methods

- Visual representations

- Chart representations

- Handouts

- 2 hours of lecture, illustrations and discussions

- No tests, except group discussions

- Live example of Artificial Intelligence Systems.

Content

The following is the content/topic of the curricumlum:

I.   THE INTELLIGENT MACHINE

    A. WHAT MACHINES CAN DO

        1. Machines Can Help Model Human Problem solving

        ♦ Machines Can Solve Difficult Problems

        ♦ Machines Can Help Experts Analyze and Design

        ♦ Machines Can Understand Simple English

        ♦ Machines Can Understand Simple Images

        ♦ Machines Can Help Manufacture Products

        ♦ Machines Can Learn from Examples and Precedents, so are Humans

        ♦ Machines Can Model Animal Information Processing

    B. CRITERIA FOR SUCCESS

        1. Learning and Teaching Styles

        ♦ Kolb's Theory and its Applications

A. CONTROL CHOICES

    1. Where is Knowledge about Procedures
      Stored?

    ♦ What Process Decides Which Procedures
      Act?

    ♦ How Are Computational Resources
      Allocated?

    ♦ What Kind of Procedures Are There?

    ♦ How Do Procedures Communicate?

    ♦ MOVER Generations Illustrate Fancy
      Control Options

IV. PROBLEM-SOLVING PARADIGMS

A. RULE-BASED SYSTEMS FOR SYNTHESIS

    1. A Toy Synthesis Bags Groceries

    ♦ XCON Configures Computer Systems

    ♦ Rule-based Systems Can be Idiot
      Savants

B. RULE-BASED SYSTEMS FOR ANALYSIS

    1. Many Rule-based Systems Are Deduction
      Systems

    ♦ A Toy Analysis Systems Identifies
      Animals

    ♦ Rule-based Deduction Systems Simplify
      Knowledge Transfer

        ◆ Certainty Factors Help Determine

          Answer Reliability

   C. RULE-BASED SYSTEMS FOR MODELING HUMAN

     THINKING

       2. Rule-based Systems Can Model Some

         Human Problem Solving

      ◆ Protocol Analysis produces

        Production- System Conjectures

V. REPRESENTING COMMONSENSE KNOWLEDGE

   A. REPRESENTATION

   1. Semantics Distinguishes Semantics Nets

     from Ordinary Nets

    ◆ There are Several Approaches to

     Semantics

   B. INHERITANCE, DEMONS, DEFAULTS, AND

     PERSPECTIVES

      1. Inheritance Enables Description

       Movement from Classes to Instances

     ◆ Demons Enable Access to Initiate

       Action

     ◆ Defaults Enable Assumption in Lieu of

       Fact

     ◆ Perspectives Enable Purpose to Guide

       Access

2. Access Involving Parts Requires

Matching

♦ Special Links Make Inheritance

Opportunities Explicit

C. EXPANSION INTO PRIMITIVE ACTS

1. Schank's Primitive Acts Describe Many

Higher-level Acts

♦ Acts Often Imply Implicit State

Changes and Cause-effect Relations

♦ Acts Often Imply Sub-acts

♦ Primitive Facilitate Question

Answering and Paraphrase Recognition

♦ Primitive-act Frames Make Detail

Explicit

VI. IMAGE UNDERSTANDING

A. ROBOTICS

1. Robots Need the Mathematics of Kinematics

and Dynamics

♦ Robots Need Mixed Position and Force

Control

♦ Robots Need Spatial Reasoning

B. INTERPRETING SIMPLE BINARY IMAGES

1. The Feature-space Paradigm Enables

IX. IMPROVING RULES USING LEARNABLE CENSORS