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ABSTRACT

Designed for an undergraduate level survey course at the University of Alberta on developmental issues over the lifespan, the 43-module package, "Human Development," is an attempt to provide a multi-dimensional model meeting diverse instructional needs of a large teaching department. This paper provides an overview of the total design process of "Human Development," including a discussion of content development, delivery systems, programming tools, team profile, and management and implementation issues. (10 references) (GL)

Towards an Integrated Approach to Instructional Design: The Evolution of "Human Development"

Dr. Terry Tang and Ms. Katy Campbell-Bonar of the University of Alberta discuss issues involved in designing a 3-credit, multi-media course in Educational Psychology.

Designed for an undergraduate level survey course of developmental issues over the lifespan the resulting product, a 43-module package entitled **Human Development,** is an attempt to provide a multi-dimensional model meeting the diverse instructional needs of a large teaching department.

This paper will provide an overview of the total design process including a discussion of content development, delivery systems, programming tools, team profile, and management and implementation issues.

Towards an Integrated Approach to Instructional Design: The Evolution of "Human Development"

The Course

An Introduction to Educational Psychology: Development, or Educational Psychology 363 (hereafter referred to as EDPSY 363), is a 3-credit required course for all students registered in the B.Ed/AD program. Students registered in this program are in possession of at least one Bachelor-level degree in another discipline.

EDPSY 363 provides an overview of human development over the lifespan, from conception to death. Issues such as language acquisition and the development of gender identity are examined from a multidimensional perspective, employing approaches ranging from the evolutionary to the psychoanalytic.

This course has historically been taught on a lecture/seminar model, in which one instructor delivers the course content to a group of students during a regularly scheduled class meeting time. The instructor involved has typically been encouraged to personalize the course content so that in one term theoretical approaches to personality development provide the context for discussion while in another term socialization issues in middle childhood are emphasized.

In 1987 the Department of Educational Psychology, through the Dean of Education's innovative projects initiative, approached the instructional design team of the Instructional Technology Centre to re-develop EDPSY 363 in an ongoing effort to provide models of alternative instructional strategies. A related concern was that the redesign reflect a standardized approach to content delivery within an individualized format.

When initial stages of the design process were reviewed the structure of EDPSY 363 clearly emerged: developmental issues would be examined in a spiral approach through each of five main units of content. The content would be delivered in an integration of CAI/CMI, interactive video, small group seminars and print materials.

The New EDPSY 363

The redevelopment process, which took place over 18 months, resulted in the identification of 43 discrete lessons within 5 units: The Study of Human Development; Prenatal Development and Infancy; Toddlers and the Preschool Years; Schooling and Middle Childhood; and Adolescence and the Emergence of Adult Competence. Each unit is further broken down into subunits, typically three in number. Course content is available only at the lesson level. This structure is represented in Part I of Figure 1.

Figure 1 here. A representation of the organization of Toddlers and the Preschool Years/Socialization and Early Development Theories/Lessons 3B1, 3B2, 3B3.

Based on discussions with the Department involved, and the perceptions of the design team that a successful implementation strategy would include provisions for a multi-user, multi-dimensional model of content delivery; the final course design reflected a database approach. Developmental issues were subsequently explored within the context of seven self-contained MasterFiles represented in Figure 2.

Figure 2 here, the 7 MasterFiles

This structure permits the customizing of content related to instructor and student needs in EDPSY 363 and other courses in the Faculty. The seven MasterFiles that were created and provide the framework from which the units, subunits, and finally lessons were developed for EDPSY 363. This database approach is described in Part II of Figure 1.

Figure 1 here. Unit three and related MF's.

Delivering EDPSY 363

Scheduled for a full-scale field trial in July, 1989, EDPSY 363 will initially reflect a CBI approach that is highly mediated. It is anticipated that approximately 25 students will each complete a portion of the 43-lesson course during the three-week term, while attending several classroom sessions that reflect what would be a seminar approach during the regular term. The content materials will be delivered and tested on IBM PC terminals running on a Novell network with Novell Netware. These student stations will be located in both an instructional lab and in an individualized area. At least six stations will be equipped with random access videotape capability using the Panasonic 8200 player and the NV-A800 search controller. Although we were not able to provide an interface between the players and the terminals for this trial, the video search procedure has been simplified as much as possible for the students. Long-range plans for delivery include the possibility of moving towards an InfoWindow format.

For this first formative evaluation of the design, the 43 lessons have been sequenced by the instructor to reflect a chronological overview of human development. For instance, the students will complete all of Unit 1: The Study of Human Development; before being permitted to work with any lessons in Unit 2: Prenatal Development and Infancy. As well, each lesson within each subunit of the unit builds on the lesson before . . In this way, the student is encouraged to chunk information while

Figure 1

A Representation of the Organization of a Unit

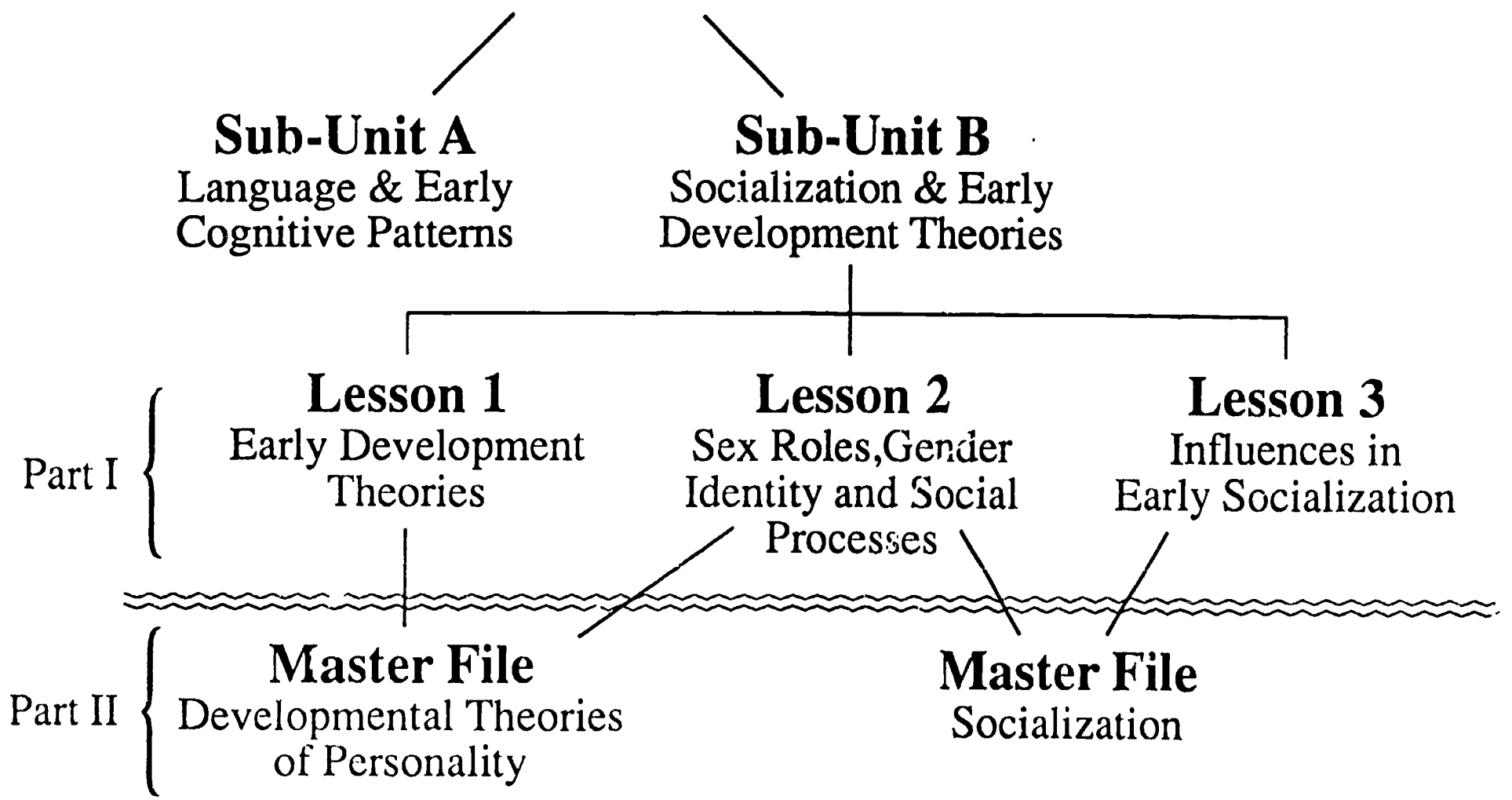
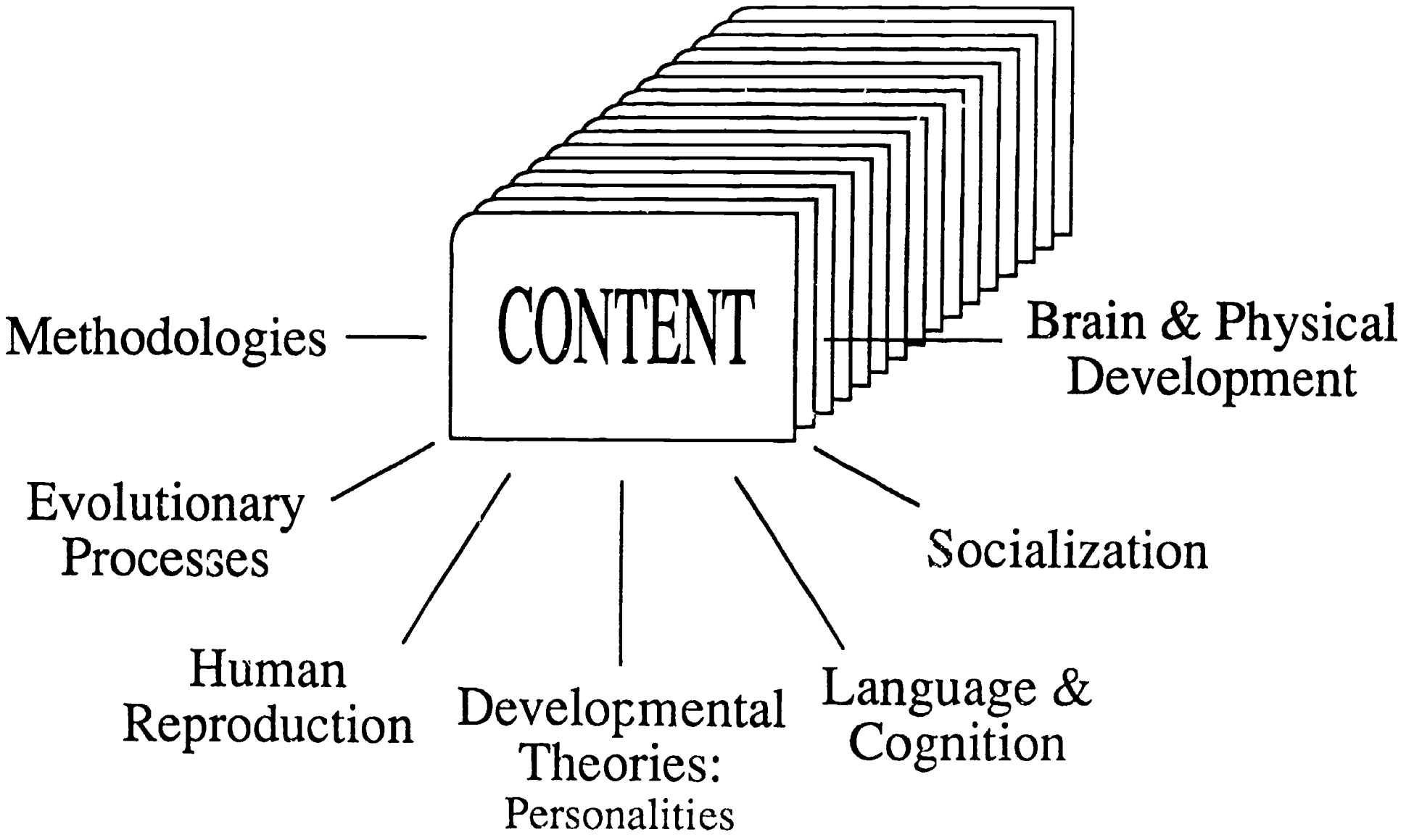


Figure 2

CAI System: Master Files



proceeding through the content. For example, the idea of gene/environment interaction is first introduced in Unit 1, Subunit A, Lesson 3 (Lesson 1A3). The student encounters this issue again in increasing complexity in Lessons 1B1, 1C1, 1C2, 1C3, 2A2, 2A3, 2C1, and in each subsequent unit through Unit 5: Adolescence and the Emergence of Adult Competence. Although these first students will not have the opportunity to master the lessons in a preferred order, this instructor option has been included in the course design.

Assessment of student understanding of developmental concepts is one of the integral parts of this course development. In the CAI portion, student comprehension is tested only at the lesson level. Each criterion-referenced lesson test, based upon mastery of which the student advances to the next lesson, has been constructed with reference to explicit behaviourial objectives on the average of four per lesson. The course instructor will set the mastery level.

A similar lesson test can be administered before lesson materials are accessed in a pretest format. With the inclusion of pretests, provision has been made for the learner to either identify skills and knowledge necessary to begin instruction, or to "challenge" the lesson, and bypass instruction which they do not need. Because some learners may find it hard to accept the idea of being tested on concepts they have not yet encountered (Dick, 1986), the pretest or challenge test opportunity has been presented as a learner option.

In order to enhance transfer, opportunities to apply concepts have been embedded throughout the modules in the form of small case studies, problem-solving activities, and embedded questions. Embedded questions in particular have been demonstrated to be effective in reinforcing declarative knowledge and problem-solving skills (Hannafin, 1986). These practice clusters act as a self-check for the learner who may choose to explore either remedial or enriching activities.

Other features that are complete for the field trial include a system glossary and bibliography. Other options will be made available in subsequent terms: these might include interwoven case studies, and student note-taking provision on a hypermedia model.

Instructional Design Issues Related to EDPSY 363

Adoption of the Instructional System Design model (ISD) has facilitated course development in the Faculty of Education.

Included in this model are mechanisms for completing a needs assessment, identifying enabling behaviours and determining performance objectives, selecting instructional strategies and performing formative evaluations. This model has been implemented within the context of planned change strategies, as examined by Hall and his colleagues at the University of Texas (1979). Implementation strategies are in place at the outset of the process and reflect this orientation towards an evolving readiness within the institution for adoption of innovation. The designers were comfortable with this basic approach but adapted it somewhat to reflect our concerns about the process within the context of four development issues: the team environment, the needs assessment, identification of the final course components, and the planning of the instructional strategies to be used.

The course development team consisted of four core members: one subject-matter expert (SME), Dr. Gerard Kysela; his research assistant; and two designers. In the course of the development work, the team expanded to include additional research assistants, a programmer analyst, one or two graphic artists, data input operators, and members of the television production crew. This course team model, which is highly collaborative, was maintained throughout the development process. Naidu (1988) cautions that for most team members, participation is a new experience requiring some "deskilling" as well as new learning. This has been true for all the team members involved in this project, as none of us had designed an entire stand-alone course of this scope, requiring decisions about new programming approaches and to be implemented with technology as yet unfamiliar to the majority of the Faculty. The subject matter itself also provided an ongoing learning experience for the designers, both of whom had studied human development issues as part of the course work for long-held undergraduate degrees. Each team member has indicated at least once that the entire process was very developmental from many points of view!

Since the SME was also a second-time client, he was considered to be a change facilitator both within his department and in the broader context of the Faculty. This client is in the **collaboration** stage of concern (Hall, 1979) in which his personal orientation reflects a concern with management of the innovation. For this client, cooperating with others to both maintain the innovation and model its creation and use has become a major professional focus.

Although the Relevance-Competence Desire (R-C-D) model of needs assessment described by Misanchuk (in Schwier, 1986) was developed for training applications, it has implications for course design within the Faculty of Education. The R-C-D model forces subject matter experts and course designers to think constantly about the perceived relevance of course materials, and how they may be sequenced to provide a coherent whole reflecting

the overall goals and objectives of the course. The competence level, or entry level behaviours, of the learner is an essential element in this model, as is the desire of the learner to master the content. These three factors, present in lower or higher degrees, interact to describe eight needs configurations that suggest a variety of training designs (Schwier, 1986).

Schwier identifies the **High Desire-Low Competence-High Relevance** configuration as representing the instructional designer's dream, in which the learner is highly motivated, realizes the need for training (learning), and perceives that the material will be quite meaningful both personally and professionally. Schwier suggests that a facilitative, albeit highly structured approach be considered for these learners, and indicates the suitably of self-instructional materials that provide continuous feedback during the learning task.

The R-C-D model is particularly relevant for our situation. Our client group will include learners who are older; some may be returning for formal education after some years in the work force or at home. All have at least one undergraduate degree in another discipline. These individuals have changed career orientation and are considered to be highly motivated. Although EDPSY 363 is a course required for their degree, we anticipate that these students will approach the learning task with high desire and determination, not fully confident of issues in human development related to education, and aware of the importance of this knowledge to their chosen careers.

An important component of the design of this course, relevant to the **High Relevance-Low Competence-High Desire** configuration of training needs, is the inclusion of the pretest. This option, available at the beginning of each lesson, serves two purposes: as a tool for the self-assessment of entry behaviours and as a challenge option for the learner. This option will eventually allow the learner to completely customize the course once the prerequisite lessons have been mastered. The designers felt that this approach would enhance the learning experience for adults who had already acquired many of the skills necessary to maximize each generative learning episode.

Generative learning, described by Jonassen (1985) and others, reflects the active role in which learners set personal goals for their learning. This model assumes that learners have developed the appropriate metacognitive skills necessary to control activities directed towards both acquisition of existing knowledge and generation of new knowledge. Instructional decisions related to generative learning include curriculum selection, lesson or objective selection, segment or module selection, and selection of preferred learning and instructional strategy. Other relevant variables include control over pacing, instantaneous reviews, skip-to-next-segment options, and access

to on-line glossaries, references, summaries, and overview of content. All of these options, as well as Gagne's Nine Events of Instruction, are represented in the design of the self-instructional modules in EDPSY 363. The designers concur with Smith and Boyce (in Wedman, 1986) that these cognitive processes can all be present in one form of CAI, the tutorial.

In somewhat of a departure from accepted ISD practice, the delivery system for EDPSY 363 was chosen at the same time as the project was accepted for re-development. There were a number of reasons for this decision: to be accepted for development a project must employ an innovative approach; the Faculty was interested in exploring InfoWindow applications; and the trend towards increasing enrolments and shrinking funding requires large-scale delivery of standardized content. Consequently, we knew very early in the process that the finished course would be IBM-based, would have computer-assisted and computer-managed components, and would integrate both motion video and computer-generated graphic elements. Consequently segments from pre-recorded videotapes were identified as being appropriate for inclusion in each of the 43 lesson modules. To do that required thinking about the use of linear materials in a completely different way.

Repurposing, a term introduced by Pawley in 1983, describes the conversion of linear materials to be used with interactive systems. Allen (1986) talks instead about **interactivating** video to enhance both generative and mathemagenic learning.

Interactivation, as defined by Allen, is "a process in which linear, fixed-paced media...are transformed to allow the selection, pacing and sequencing of messages to be based on the responses of the learner." The designers adopted both perspectives in integrating the video segments: the segment was either repurposed or interactivated depending on the purpose for which it was selected. Each lesson module contains a combination of presentation forms: Primary, or crucial generalities and instances; Secondary, or supportive information such as "helps" (Merrill, in Allen 1986); and Tertiary, or indirectly related generalities such as motivational content or nice-to-know information (Allen, 1986). Video segments identified in support of generative learning, or those that are self-selected, tended to be repurposed segments from pre-recorded videotapes. Segments selected to enhance mathemagenic strategies, which include both Primary and Secondary presentation forms, were not presented as optional and were either repurposed or interactivated depending on whether they were selected from pre-recorded videotapes or produced for this project. In the latter case, a number of devices were employed to integrate forms: video segments were introduced with explicit statements clarifying the relevant instructional objective, were preceded or followed by adjunct questions (Schloss et.al. 1986) or problems to be solved, and

provided visual stimuli for drill and practice (Hannafin et.al. 1986). All course components (computer-based materials, motion video segments, and print support) were chosen to model cognitive strategies known to be effective in enhancing the learning of large amounts of information.

Most people keep only about seven pieces of information in short-term memory. Short-term memory is where ideas residing in long-term memory are modified and interconnected with new ideas. The capacity of short-term memory can be enhanced in a process known as "chunking", in which interconnected verbal ideas and then larger schemata are interrelated functionally in new relationships (Kozma, 1986).

Since a needs assessment revealed a group of adult learners likely to approach the task with high degrees of relevance and desire, but relatively low degrees of competence, the design of the course reflects a highly-structured spiral approach to concept attainment in which an idea is extended each time it is encountered. It is hoped that providing the learner with many of these interrelated schemata will encourage the development of personally relevant cognitive maps that will eventually enhance transfer. One such possible schemata is represented in Figure 3.

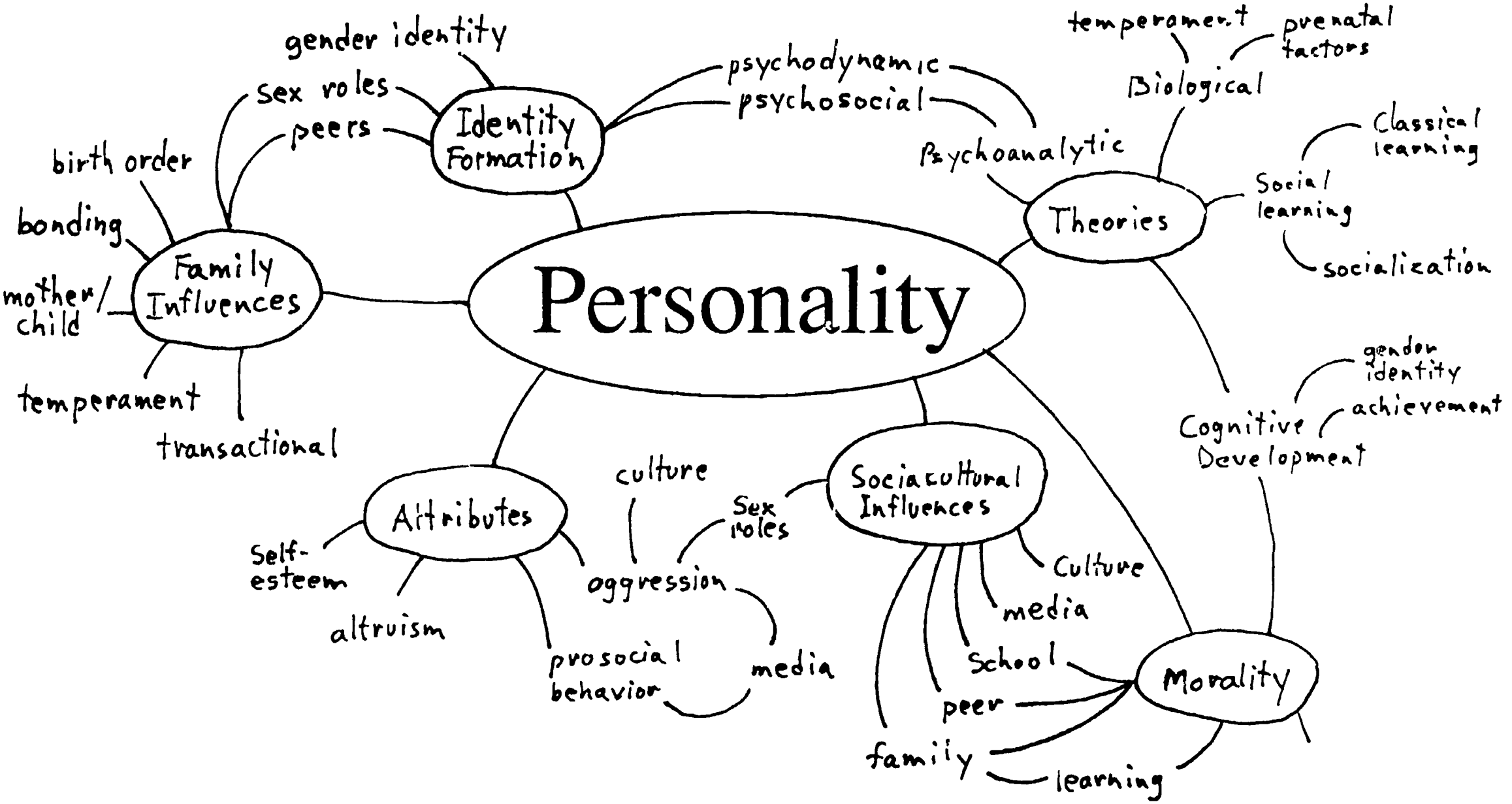
Figure 3 here: Personality Mind Map

Salomon (in Kozma, 1986) suggested that the design of instructional messages can support cognitive processing by cuing or modelling specific mental operations. Although the target group for EDPSY 363 will likely benefit from cuing processes, many of the instructional strategies chosen for this course model appropriate cognitive strategies such as questioning, searching, and chunking (Kozma, 1986). With the addition of the case studies after the first field trial, additional strategies such as decision-making, problem-solving and hypothesis generation will come into play. The broader goal of the designers is to enhance learning by encouraging the learners to both adopt appropriate cognitive strategies and to develop those that will help them transform the ideas into usable, relevant information.

EDPSY 363 has been designed on a multi-dimensional model that will allow students and instructors to consider the study of human development from a rather personalised, interactive perspective. The organization of the content into seven MasterFiles reflects an approach that permits a high degree of customization both from within the course structure and in using each "mini database" as a stand alone topic. Students are encouraged to play an active role by becoming involved in planning their own learning. This integrated multi-media format of content delivery will, it is hoped, engage the learner in the learning task at the outset and encourage him/her to maintain a high level of desire throughout the course. The field test

Figure 3

Personality Mind Map (*schematic*)



planned for July, 1989, will indicate the nature of the revisions needed for a successful full-scale implementation in January of 1990.

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