The article *The Development of Expertise: The Journey from Acclimation to Proficiency* by Patricia Alexander discusses the components of the Model of Domain Learning (MDL). The MDL describes the process of developing expertise in academic domains. Expertise development is characterized as a systematic developmental process across and within stages of intellectual growth.

MDL differs from previous learning models in several aspects. Previous models focused on learner acquisition of knowledge for the improvement of performance. MDL focuses on improving student learning and development. Previous research has focused on non-academic domains. The MDL focuses on learning in academic domains. According to Alexander, this is significant for several reasons.

Alexander focuses on knowledge, strategic processing, and interest as three components of the acquisition of expertise. These components are considered in their interactions with acclimation, competence and proficiency, the three stages of domain learning.

There are two forms of knowledge presented: domain and topic knowledge. Domain knowledge encompasses the breadth of knowledge within a field. Topic knowledge relates to specific items or instances of knowledge within the scope of domain knowledge. Thus, domain knowledge includes topic knowledge in multiple topical areas. Within the domain of instructional
technology, topic knowledge areas would include web design, programming, instructional design, evaluation, etc. Strategy processing addresses the development of more sophisticated learning strategies by the student as he/she progresses towards expertise. Alexander describes surface-level learning strategies and contrasts them with deep processing learning strategies. Surface-level strategies, like rereading or paraphrasing, allow the student to develop initial knowledge of subject matter. Deep-processing strategies involve delving into the material, making judgments and forming opinions regarding the credibility of the material. The MDL separates interest into individual interest and situational interest. Individual interest is the long-term interest in a domain that students bring to the learning environment. Alexander identifies the two forms of individual interest as general and professional. General interest is a non-academic interest in a domain or topic. This is contrasted with professional interest which is specialized, goal oriented, and aligned with professional activities. Situational interest is a current interest in a current situation. Contrasting with individual interest, which is long term interest in a domain, situational interest is fleeting, short term and relates to the immediate situation. These components influence each other differently within every stage of expertise development (acclimation, competence, proficiency).

In the initial stage of expertise development, acclimation, demands are placed on students as they orient themselves to new, unfamiliar domains. Learners in acclimation lack cohesive, integrated domain knowledge. Students engaged in acclimation are consistently exposed to new topics within a domain.
To deal with this multiplicity of topics they employ surface-level strategic learning techniques to facilitate topical knowledge acquisition.

By the competence stage of expertise development, students have acquired a foundational basis of knowledge in a domain. Additionally, their knowledge is more cohesive and based on principles within the domain. Competent learners engage in both surface-level strategies and deep-processing strategies when learning new topics and concepts within the domain. The strategic changes and knowledge acquisition result from the development of the learners' personal interest and reduction in situational interest.

Alexander states that a synergy among components (knowledge, strategic processing and interest) is necessary for the learner to move from competence into the proficiency/expertise stage. In addition to a broad and deep domain knowledge base, experts contribute to the sum knowledge of the domain through questions and research that expand the boundaries of the domain. They engage in identifying problem areas within the domain, and use deep-processing strategies to identify problem areas and develop new knowledge.

Several implications are drawn in the article based on MDL and related research. First, while high school students should ascend through acclimation into the competence stage, they should not be expected to attain expertise in any domain in their K through 12 experiences. According to Alexander, the demands of knowledge, strategic process, and interest ensure that relatively few people will ever attain expertise in any domain. Consequently, the movement into competence by high school students is a commendable and attainable goal.
Secondly, strategic processes are needed as learners progress towards expertise. Since students do not inherently know these strategic processes, they must be acquired and practiced as part of the learning process. Third, individual participation and investment in the learning process is equally important with knowledge and strategic process acquisition. Fourth, because of their limited and fragmented knowledge, learners in the acquisition stage require guidance to differentiate between important and peripheral content along with accurate and inaccurate information. Finally, the development of expertise is a never-ending journey. Domains continually develop; adding knew knowledge and learning strategies. Experts must maintain currency and fluency with their fields, requiring continual study, research, and learning. Expertise is a continual journey, not an end-result goal.

**MAJOR THEORIES**

Alexander's basis for development is not well defined in the article. However, the overall driving theory seems to be constructivist. According to David Jonassen, "constructivism asserts that we learn though a continual process of constructing, interpreting, and modifying our own representations of reality based on our experiences with reality" (1994). This is consistent with Alexander's discussion of the importance of individual participation and involvement in the development of expertise. A second characteristic of constructivism is the concept that people develop their knowledge in personally significant ways (Gurney, 1989). This is consistent with Alexander's discussion of the development of individual learning strategies for the advancement into
expertise. Throughout the paper Alexander states and implies that the
development of expertise through acclimation, competence and into proficiency
is a process where the learner interacts with the instructional environment,
acquires and develops learning strategies, and assimilates expertise by seeking
and developing new knowledge that is built upon previously developed
knowledge. In essence, experts build their own knowledge in the development of
expertise. This is consistent with what Duffy and Cunningham (1996) call the
"general view" of constructivism. The two primary aspects of this general view
are that in constructivism learning is an active process of constructing rather than
acquiring knowledge and that instruction is the process of supporting that
construction rather than communicating knowledge.

Table one depicts the relationship between the components and stages of
the Model of Domain Learning. Viewed in this tabular format, the changes in
component application as the learner progresses from acclimation through
competence to expertise, along with the relationships between the components
within the stages, are readily apparent.

The model provides both educators and learners with a roadmap to use in
the development of expertise. Educators who are familiar with the MDL can use
it as a format for curriculum development. Programs can be developed that

<table>
<thead>
<tr>
<th>Components</th>
<th>Knowledge domain / topic</th>
<th>Strategic Processing surface-level / deep-processing</th>
<th>Interest individual (general or professional) / situational</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stages</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Acclimation</td>
<td>Learners have limited and fragmented knowledge, both domain and topic</td>
<td>Novel and challenging tasks prompt learners to use surface-level strategic processing</td>
<td>Reliance on situational interest to maintain learner focus and performance</td>
</tr>
</tbody>
</table>
Competence | Learners demonstrate a foundational body of domain knowledge | Learners use surface-level and develop deep-processing strategies to acquire knowledge | Development of individual interest and reduced reliance on situational interest

| Expertise | Broad, deep knowledge base both domain and topic. Experts contribute to domain knowledge | Learners use deep-processing strategies almost exclusively | Individual interest high. Experts maintain high level of engagement over time

advance the learner through the stages by designing the appropriate conditions for each of the components in each stage. For example, by recognizing the level of knowledge mastery a learner in the acclimation stage possesses, the educator can provide the learner surface-level strategic processing techniques. Educators who understand that the motivational interest of the acclimation stage learner is usually situational can focus assignment requirements to maintain learner focus and performance as individual interest develops. Learners who understand the developmental process depicted by the MDL can prepare themselves for expertise development. Deep-level strategic processes can be developed and practiced to aid knowledge acquisition throughout their chosen domain. Additionally, the learner can develop situational self-motivators to assist themselves when studying topics within their domain or in corollary domains where they lack the motivation of their primary domain.

While the article indicates that significant research has been performed in the MDL development and evaluation, applying the MDL to curriculum development and learner guidance provides an additional focus for potential research. The application of the MDL as a format for curriculum development and analysis of the effectiveness of the application in expertise provides a researchable area, as does its application as a guide for learner development.
Several questions relevant to the model also provide avenues for potential research:

1. Are there intermediary stages between those defined by the MDL that need to be defined and researched to properly understand expertise development?

2. Are the stages actually a continuum rather than three distinct stages as indicated in the MDL?

3. What happens to experts in a domain when they are learning knowledge outside of their area of expertise?

4. Do they start knowledge acquisition in the new domain at the acclimation stage?

5. Are learning strategies developed in and for their domain of expertise applicable to the new domain?