Let’s take it apart and see what it’s all about!
What happens during learning?

Information Processing Model

- Information comes in
- Information is processed
- Information goes out
Information Processing Model

Foundation

Names of stages or processes that take place

Reception → Association → Expression
Information Processing Model

Other terms that refer to the basic sequence

Reception → Association → Expression

Decoding Input

Analysis Cognition Processing

Expression Encoding Output
Introducing channels
Through which information flows

Association

Types of Reception
Visual
Auditory
Tactile
Kinesthetic

Types of Expression
Motor
Written
Spoken
Verbal
Information Processing Model

- **Visual**
  - Clarity of material (speak clearly, readable handouts, contrast, colors)

- **Auditory**
  - Speed of presentation (speed of speech, video material, progressing through material)
  - Organization of material (“laddering,” sequence, consistency)

- **Tactile**
  - Absence of internal or external distraction (internal = anxiety, lack of sleep) (external = temperature, environmental noise)

- **Kinesthetic**

**General Factors Affecting Reception**

**Types of Expression**

- Foundation
Using Processes and Channels to Describe Learning Difficulties

- Auditory receptive difficulty
- Motor expressive difficulty
- Verbal Expressive difficulty
- Visual perceptual difficulty
- Auditory discrimination difficulty
- Visual acuity difficulty
- Receptive and expressive language disorder

You can begin to see a link between information processing and educational diagnosis?
Terminology 1.1

Decoding
Receptive
Associative
Tactile
Kinesthetic
Verbal channel
Expression
Channel
Process
Encoding
Psycholinguistic
Cognitive
Analysis
Adding Three Critical Overarching Cognitive Functions to the Basic Information Processing Model
Level 2

Information Processing Model

Pervasive Cognitive Processes

Attention

- Visual
- Auditory
- Tactile
- Kinesthetic

Association

- Visual
- Motor
- Gesture
- Verbal

Reception

Decoding

Analysis

Cognition

Expression

Encoding
In order of information to get in, the student needs to attend:

1. **Awareness**
2. **Intention**
3. **Attention**
4. **Reception** (Decoding)
   - **Visual**
   - **Auditory**
   - **Tactile**
   - **Kinesthetic**
5. **Analysis** (Cognition)
6. **Expression** (Encoding)
   - **Motor**
   - **Gesture**
   - **Verbal**

**Information Processing Model**
**Information Processing Model**

*Information must be recognized for cognitive registration*

**Components of Attention**
- Specificity of focus
- Discrimination ability
- Accurate perception
- Filtering and pattern recognition
- Perseverance in the face of difficulty
- Resistance to distraction
- Resistance to frustration
- Perceptiveness
- Amount of effort
- Self-monitoring
- Attention “swapping”
Recognition is facilitated by knowing to be ready for input

Components of Awareness
- Goal clarity
- Perceived Valuation
- Advance notice of importance
- Potential punishment or reward
- Past experience
- Situational cues
Information Processing Model

Registration is facilitated by a desire to register the information

Components of Intention
- The internalized “true” desire to achieve
- An internalized willingness to cooperate
- The individual’s “big picture” of who they are and what they want

Level 2

<table>
<thead>
<tr>
<th>Reception</th>
<th>Analysis</th>
<th>Expression</th>
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</thead>
<tbody>
<tr>
<td>Visual</td>
<td>Tactile</td>
<td>Verbal</td>
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<tr>
<td>Auditory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kinesthetic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Cognition

Intention

Awareness

Attention

Components of Intention

- The internalized “true” desire to achieve
- An internalized willingness to cooperate
- The individual’s “big picture” of who they are and what they want
What can an instructor do to address attention difficulties?

1. Motivating and encouraging students to want to attend
2. Prepping the students by providing background information
3. Calling immediate attention before starting content
4. Guiding students through identifying what to attend to
5. Providing students with games and tasks that require and develop perseverance
6. Counseling students to sustain effort and show flexibility when difficulty is encountered
7. Teaching “authentic” and “applied” materials
8. Provide “activity” learning
9. Get the student “on your team”
10. Teach “filtering” of information (sorting important from irrelevant)
11. Providing short term rewards
12. Timing tasks requiring attention and plotting progress
13. Introducing students to on-line activities that require attention
14. Breaking larger tasks into smaller units
15. Ask students to repeat your directions
Information Processing Model

Visual
Auditory
Tactile

Attention - Awareness - Intention

Association

Information swapping

Short term Memory
Kinesthetic
Active Working Memory

Retrieval from Long Term Memory
Memory Coding
Long term storage

Memory

Reception
Analysis
Expression
Information Processing Model

- **Short term Memory**
- **Memory Coding**
- **Long term storage**

**Attention – Awareness – Intention**

- **Visual**
- **Auditory**
- **Tactile**

**Association**

- **Where I want to be**
- **Where I am now**
- **Where I have been**

**Reception**

- **Analysis**
- **Expression**

**Recall from Long Term**

- **Motor**
- **Gesture**
- **Verbal**
Executive Processing

Attention
- Managing time, space, materials and themselves
- Planning, organization and foresight
- Self-evaluation and regulation
- Sequencing and prioritizing
- The conductor of the orchestra
- Concern for quality and approval
- Acceptance of authority and supervision

Association

Memory

Reception Analysis Expression

Information Processing Model

Executive Processing

Verbal
- Gesture
- Motor
- Visual
These simple factors can account for a significant percentage of learning difficulties:

- Presentations where the speaker does not speak loud enough
- Handouts or writing on the board that are illegible
- Insufficient repetition of material
- Material that is covered too fast or in a disorganized manner
- Moving ahead before existing content is mastered
- Competing environmental distractions
- Inadequate size or loudness of stimulus
Terminology 1.2

- Decoding
- Receptive
- Associative
- Tactile
- Kinesthetic
- Verbal
- Expression
- Channel
- Process
- Encoding
- Psycholinguistic
- Cognitive
- Analysis
- Focused attention
- Initial attention
- Sustained attention
- Awareness
- Intention
- Perceived relevance
- Experiential framework
- Perseverance
- Distraction resistance
- Frustration resistance
- Filtering
- Attention swapping
- Metacognition
- Short term memory
- Active working memory
- Memory coding
- Long term memory
- Retrieval
- Memory Deterioration
- Memory Enhancement
- Executive Processing
- Executive functions
- Self-regulation, planning, inhibition and self-monitoring
- Subordination
- Visual and auditory acuity
- Stimulus clarity
- Speed of presentation and processing
- Stimulus repetition
- Visual and auditory discrimination
Information Processing Model

Executive Processing

Higher Level Cognitive Processes

Memory

Analysis

Expression

Reception

Attention

Visual

Objects

Representations

Symbols

Tactile

Kinesthetic

Verbal

Objects

Representations

Symbols

Objects

Representations

Symbols

Objects

Representations

Symbols

Richard Gacka ABLE LD Project
Objects
• Real things that being able touch, feel and manipulate have evolved into complex concepts.

Coded Representations that Represent Objects
• Pictures
• Diagrams
• Words
• Symbols

Higher Level Concepts
• Meanings
• Abstractions
• Projections
Recognition
Discrimination
Size
Shape
Orientation
Directionality
Depth
Color
Memory (recall)
Naming
Association with concepts
Memory (production)
Pattern recognition
Completion based on parts
Testing correctness
Rule application
Rule violation recognition
Focus
Perseverance
Information Processing Model

Executive Processing and Self-Monitoring

Higher Level Cognitive Processes

Vocabulary and Inner language

Memory, Retrieval and "data swapping"

Reception Decoding

Analysis

Expression Encoding

Sustained Attention and Concentration

Objects, Symbols

Decoding Input

Coding Output

Visual

Gesture

Verbal

Motor

Tactile

Auditory

Visual

Motor

Verbal

Vocabulary and Inner language
**Evaluation:** appraise, argue, assess, attach, choose, compare, defend, estimate, judge, predict, rate, core, select, support, value, evaluate.

**Synthesis:** arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organize, plan, prepare, propose, set up, write.

**Analysis:** analyze, appraise, calculate, categorize, compare, contrast, criticize, differentiate, discriminate, distinguish, examine, experiment, question, test.

**Application:** apply, choose, demonstrate, dramatize, employ, illustrate, interpret, operate, practice, schedule, sketch, solve, use, write.

**Comprehension:** classify, describe, discuss, explain, express, identify, indicate, locate, recognize, report, restate, review, select, translate.

**Knowledge:** arrange, define, duplicate, label, list, memorize, name, order, recognize, relate, recall, repeat, reproduce state.
<table>
<thead>
<tr>
<th>Recognition and Knowledge Level</th>
<th>Comprehension and Understanding Level</th>
<th>Application Level</th>
<th>Analysis and Manipulation Level</th>
<th>Synthesis and Integration Level</th>
<th>Critical Reasoning and Evaluation Level</th>
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<td>Point out</td>
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<td><strong>I can Use</strong></td>
<td><strong>I can Manipulate</strong></td>
<td><strong>I can Combine</strong></td>
<td><strong>I can Test</strong></td>
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</table>
Concurrent Information Processing Model

Executive Processing and Self-Monitoring

Higher Level Cognitive Processes

Vocabulary and Inner language

Memory, Retrieval and “data swapping”

Reception

Decoding

Analysis

Expression

Encoding
Level 3 Applied Mathematics Sample Item

In your job as a cashier, a customer gives you a $20 bill to pay for a can of coffee that costs $3.84. How much change should you give back?

1. $15.26
2. $16.16
3. $16.26
4. $16.84
5. $17.16

Awareness, motivation and attention level:

Input level:

Association level:

Expression level:

Memory demands:

Executive demands:

Decoding and Encoding needed:
ATTENTION CASHIERS:

All store employees will now get 20% off the price of clothes they buy here. Please follow the new directions listed below.

**Selling clothes to employees**

- Ask to see the employee's store identification card.
- Enter the employee's department code number into the cash register.
- Use the cash register to take 20% off the price. Then push the sales tax button.
- Write your initials on the sales receipt.
- Sell clothes to employees during store hours only.

**Accepting clothing returns from employees**

- Employees receive a store credit certificate for clothes they return to the store.
- Store credit certificates are next to the gift certificates.
- Employees may not get a cash refund for clothes they return to the store.

You are a cashier. According to the notice shown, what should you write on a store employee's receipt?

A. The employee's identification number  
B. The employee's department number  
C. The amount of sales tax  
D. The 20% discount price  
E. Your initials

Awareness, motivation and attention level:

Input level:

Association level:

Expression level:

Memory demands:

Executive demands:

Decoding and Encoding needed:
Applied Mathematics Level 5 Sample Item

Quik Call charges 18¢ per minute for long-distance calls. Econo Phone totals your phone usage each month and rounds the number of minutes up to the nearest 15 minutes. It then charges $7.90 per hour of phone usage, dividing this charge into 15-minute segments if you used less than a full hour. If your office makes 5 hours 3 minutes worth of calls this month using the company with the lower price, how much will these calls cost?

1. $39.50
2. $41.48
3. $41.87
4. $54.00
5. $54.54

Awareness, motivation and attention level:

Input level:

Association level:

Expression level:

Why this is a Level 5 item:

- There are several steps of logic and calculation.
- Examinees must perform calculations using mixed numbers.
- Examinees must compare their answers with two sets of calculations and choose the "best deal."
Goldberg's Auto Parts is served by more than fifty different accounts, each with its own sales representative, company name, corporate address, and shipping address. As a shipping and receiving clerk at Goldberg's, you are required to return defective merchandise to the manufacturer.

Standard procedure for returning an item begins with your written request to the company for authorization.

Always send the request to the corporate address, not to the shipping address. Unless the company file folder contains a form for this procedure, write a business letter to the manufacturer supplying the item's stock number, cost, and invoice number; the date it was received; and the reason for its return. The manufacturer's reply will include an authorization number from the sales representative, a sticker for you to place on the outside of the box to identify it as an authorized return, and a closing date for the company's acceptance of the returned item. If you do not attach the provided sticker, your returned box will be refused by the manufacturer as unauthorized, and you will need to obtain a new letter, authorization, sticker, and closing date. Always send a returned box to the shipping address, not to the company's corporate address.
According to the policy shown, what should you do if you lose an authorization sticker?

1. Send a request for a return authorization along with the rejected part directly to the manufacturer's shipping address.
2. Send a request for return authorization along with the rejected part directly to the manufacturer's corporate address.
3. Repeat the standard procedure to obtain a new letter, authorization, sticker, and closing date.
4. Use a sticker from another company's folder.
5. Send the rejected part to your sales representative.

Awareness, motivation and attention level:

Input level:

Association level:

Expression level:

Memory demands:

Why this is a Level 5 item:

- Sentences are longer and more complex.
- The document contains many steps to be followed and details to be considered.
- The vocabulary includes some jargon and specialized terms.
- Instructions include conditionals.
- Individuals must apply straightforward instructions to a new situation that is similar to the one described in the material.