**Universal Instructional Design – An Approach to Designing & Delivering On-line and Hybrid Courses**

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**ABSTRACT**

As we examine on-line and hybrid (half on-line, half in-class) courses, many instructors are trying to find ways to “teach” their material and “engage” students in their classes. Never research is suggesting using Universal Instructional Design techniques. Universal Instructional Design (UID) uses an approach to our teaching that consists of proactive design and use of inclusive instructional strategies that benefit the broadest range of learners. We know that our diversity in our classrooms is expanding. In addition, our on-line and hybrid courses have additional demands to engage our students. We can actually use technology as a critical tool for creating these inclusive courses. We can have much greater flexibility in instructional format and be able to expand on our resources and options. This paper will look at ways in which we can address UID in our on-line and hybrid environments.

**Keywords:** Universal Instructional Design, Learning Styles

1. **Overview Of Universal Design (UD)**

Universal Instructional Design was evolved from the movement called Universal Design that was created for the architectural community. [2] Universal Design used the concepts of making a building accessible, flexible and functional for all types of users. Designers that apply the universal design concepts and principles create buildings and environments that meet the needs of a wide variety of users with many different characteristics.

2. **Universal Instructional Design (UID)**

UID means the design of instructional materials, activities and environments to meet the potential needs of all learners. When we consider UID, we look at designing and delivering instruction. UID helps provide the means to identify and eliminate unnecessary barriers to teaching and learning. UID gives faculty a framework from which to reflect on how to maximize learning for students of all backgrounds and learner preferences. UID is a learner-centered process that incorporates similar principles of UD. UID helps to create conditions that are conducive for all types of learning and learners. [3]

2.1 **The Seven Principles of UID**

The seven principles of UID follow a similar pattern from UD. These seven principles can be used by faculty for various parts of designing a course. They can be used for the design of learning, including courses, assignments, assessments and activities; the design of materials or tools, including manuals, handouts, CDs, videos; the design of the environment, including the classroom, websites, and learning spaces; and the planning of delivery strategies. The seven principles are:

1. Accessible and fair (equitable) use;  
2. Flexibility in use, participation and presentation;  
3. Straightforward and consistent;  
4. Information is explicitly presented and readily perceived;  
5. Supportive learning environment;  
6. Minimize or eliminate unnecessary physical effort or requirements;  
7. Learning space accommodates both students and methods.[1,2]

2.1.1 **Accessible and Fair Use**

This principle looks at the ways in which students fulfill the requirements of a course – identical if possible, equivalent when not. The instruction should be designed to be useful and accessible by students with different abilities, learning styles and diversity. Some goals for this principle include learner-centered instruction and open learning. This principle facilitates active learning and accommodates various learning styles.

2.1.2 **Flexibility in Use, Participation and Presentation**

Research has shown that the most effective learning takes place when it is multimodal. This means that material is presented in multiple forms, and students have multiple means of accessing and interacting with material and demonstrating their knowledge. The students can interact regularly with the instructor and peers within a broad range of learner preferences. Goals include learner-centeredness instruction and open learning. This principle facilitates active learning and accommodates various learning styles.

2.1.3 **Straightforward and Consistent**

With this principle instruction is designed in a clear and straightforward manner using tools that are intuitive. The goal here is again learner-centeredness. It facilitates time on task.

2.1.4 **Information is Explicitly Presented and Readily Perceived**

Course expectations are transparent and instructors are easy to understand with very clear communication. Barriers to receiving or understanding information are removed and the information is presented in multiple forms. This encourages
contact between student and instructor, accommodates various learning styles and facilitates time on task.

2.1.5 Supportive Learning Environment
Instructors anticipate that learners will make mistakes, but when errors are handled properly, they present powerful learning opportunities. This also takes into account the concept of preparation for backup so that learning will not be interrupted. This encourages contact, accommodates various learning styles and gives prompt feedback.

2.1.6 Minimize or Eliminate Unnecessary Physical Effort or Requirements
Instruction is designed to minimize non-essential physical effort (ones not essential to a learning outcome) in order to allow for the maximum attention to learning. This helps to facilitate time on task.

2.1.7 Learning Space Accommodates Both Students and Methods
This is where the learning space is designed to be accessible and the environment supports multiple instruction strategies. This allows for collaboration among students, engages in active learning and facilitates various learning styles.

3. Learning Styles
There has been extended research done in the areas of learning styles. Some early pioneers such as Myers and Briggs, and Keirsey and Bates broke personality types down into 16 different types. These were based on four pairs of personality – extrovert versus introvert, sensing versus intuitive, thinking versus feeling, and judging versus perceiving. The research also looked at various ways in which different personality types preferred to “learn”. [ ] Learning styles are the characteristic ways in which students acquire, perceive and process information. Students have many different learning styles. Learning styles focus on different types of information, process this information differently and achieve understanding of information at different rates. The extravert/introvert explains where students tend to focus their attention and get their energy. The sensing/intuitive shows how people take in information, how they are aware of things, people, events and ideas. This is the biggest impact on how students learn. The thinking/feeling explains the ways in which students evaluate and come to conclusions about information. It then helps students make decisions. The judging/perceiving type looks more at life style and work habits that students prefer. [23] The following table shows each type, their preferred learning style.

<table>
<thead>
<tr>
<th>Table 1. Personality Types &amp; Learning Styles</th>
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<tbody>
<tr>
<td>Extraverts</td>
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<tr>
<td>Introverts</td>
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| | of reflection, thought and contemplation | quiet, mental reflection; attention flows inward to their own thoughts, ideas and impressions |
| Sensing | Rely on five senses to take in information; look for information that is real and tangible; are practical and realistic | Learning best when they start with the familiar, solid facts before moving toward abstract concepts and principles; ask who, what, when, where? |
| Intuitive | Seek out patterns and relationships among the facts they have gathered; they trust hunches and look for the “big picture” | Learning best when presented with the theory before deciding that facts are important; focus on general concepts more than details and practical matters; find associations and meanings; ask why? |
| Thinking | Look at logical consequences of a choice or action; make decisions based on logic, analysis and reason | Use logical analysis to understand material and analyze experiences and material to find logical principles underlying them; focus on tasks |
| Feeling | Consider what is important to them and to other involved; appreciate and support others; strive to create harmony; make decisions based on feelings, personal likes and dislikes | Look for a personal connection in classroom material, seeking to relate ideas and concepts to personal experiences; learn by helping others |
| Judging | Like to live in a planned, orderly way and try to manage and regulate their lives; like closure and moving on | Plan their work and stick to the plan; want to know what they are accountable for and by what standards they will be graded |
| Perceiving | Are spontaneous and don’t like to be boxed in by deadlines or plans; like to postpone action and seek more data; are flexible | May start many tasks, and find it difficult to complete them; tend to follow impulses |

3.1 Keirsey and Bates Temperament Types
Keirsey and Bates took the 16 basic personality types and put them into categories of four temperament types. These temperament types look at the psychological needs, behavior, talents and values that interrelate to form each combination temperament. The four basic temperament combinations are: Guardian – SJ (sensing/judging), Artisan – SP (sensing/perceiving), Idealist – NF (intuitive/feeling), and Rationalist – NT (intuitive/thinking). [10,18]
3.2 Temperament and Teaching Styles
As instructors we need to be aware of our own learning style and how it affects our teaching styles. Guardian instructors like to use reliable methodologies they have used before. They usually use traditional techniques experienced as students. They explain material with step-by-step procedures, follow routines and encourage student-faculty interaction. They are willing to learn new teaching techniques if they have time to adapt to changes. They create and preserve harmony in the classroom. Guardians provide clear, detail syllabi, define clear expectations for assignments and communicate their expectations clearly. They may have trouble changing for some circumstances. They can be pessimistic as they assume things will go wrong, but they believe they are just being realistic.

Artisan instructors tend to bring excitement and energy to the classroom. Lectures are typically organized, but may not follow a step-by-step procedure. Artisans can quickly adapt lesson plans to encompass opportunities. Syllabi will have objectives and goals, but may not have detail for certain dates. They tend to make learning fun, using demonstrations, entertaining illustration and story telling to get points across. They can focus teaching on things that can be applied to the present and have good negotiating skills.

Idealist instructors are interested in pursuing development of their own and their students’ highest potential. They are skillful at determining what each student needs emotionally and intellectually to achieve success. They usually conduct a democratic classroom that involves the students decision making. Idealists change lesson plans to accommodate student’s needs. They provide ample opportunities for group discussion and group projects. They are very enthusiastic about teaching and are interested in anything that is innovative and new.

Rationalist instructors encourage individualism, autonomy, intellectual curiosity and achievement in their students. They are often experts in their field. They love their subject and are able to communicate that love to the students. They inspire and encourage the students. Rationalists are subject-centered and tend to be more impersonal in their approach. They may move too quickly for some students. They enjoy designing new curriculum and use new tactics to teach. They encourage classroom debate if it is intellectually stimulating. [18,19]

3.3 Other Categories of Learning Styles
Other researchers have categorized learning styles. The three basic learning styles are visual learners, auditory learners and tactile or kinesthetic learners. Visual learners learn best by seeing. Auditory learners learn best by hearing. Tactile or kinesthetic learners learn best by touching or experiencing. [11,12,13,22]

Felder and Soloman [7] expanded on this concept and created four categories of learning styles. The first category is active and reflective learners. Active learners retain and understand information best by doing something active with it, such as discussing it, applying it or explaining it to others. They like group work and sitting through lectures without “doing” anything is hard. Reflective learners like to think about information quietly first. They prefer working along and do better at sitting through lectures taking notes than active learners. [4,5,6]

The second category is sensing and intuitive learners. Sensing learners like learning facts. They like solving problems using well-established methods and dislike complications and surprises. Sensors do not like being tested on material that has not been explicitly covered in class. They are good with details and good at memorizing facts and hand-on laboratory work. They are practical and careful in their work and don’t like courses that have no connection to the real world. Intuitive learners prefer discovering possibilities and relationships in their learning. They like innovation and dislike repetition and are good as grasping new concepts and are comfortable with abstractions and mathematical formulations. Intuitive learners don’t like memorization and routine calculations.

The third category is visual and verbal learners. Visual learners remember information best by seeing it. They like pictures, diagrams, flow charts, time lines, films, videos and demonstrations. Verbal learners learn best from words, both written and spoken explanations.

The fourth category is sequential and global learners. Sequential learners gain understanding in linear steps, with steps following a logical sequence. They tend to follow logical stepwise paths in finding solutions to problems. They may not understand material, but they can do something with it. Global learners learn in large jumps, absorbing material almost randomly without seeing any connection. They seem to suddenly “get it”. They solve complex problems quickly or put things together I novel ways once they have the big picture, but they may not know how they actually got to the answer. They may have difficulty solving problems until they get the big picture. [7]

4. Learning Styles, The Classroom And UID
What do all of these things mean to the instructor? We as instructors first need to study and become aware of the different learning styles that our students could have. Second, we need to know what our own learning style is so that we can understand what our comfort level is for presenting information in the classroom. Once we are familiar with the various learning styles and temperament types, we can begin to create a classroom that can be as inclusive as possible for all diversities of learning styles. What is a classroom? For most faculty, we mean the face-to-face class environment. However, we have two other prominent types of classes – hybrid (one-half face-to-face and one-half on-line) and completely on-line – also referred to as distance learning. Can we use our knowledge of learning styles and UID to create a “class” that uses the technology as a tool for implementing UID concepts? [9]

4.1 Practical Suggestions for Learning Styles
First, beginning with the three basic learning styles, visual, auditory and tactile/kinesthetic, we can examine some strategies to help students use their preferred learning style to the fullest.
The following table shows some suggestions for each of the three learning styles. [12]

Table 2. Suggestions for the Classroom for Three Learning Styles

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Learners</td>
<td>Use pictures, charts, graphs, etc; move around during the lecture so you can be seen; provide handouts; use multi-media</td>
</tr>
<tr>
<td>Auditory Learners</td>
<td>Present class discussions and debates; allow students to present material with ideas; use story telling to get across an idea</td>
</tr>
<tr>
<td>Tactile/Kinesthetic Learners</td>
<td>Break the lecture up into small segments with breaks; have students move around in the classroom; use bright colors in power point or colored chalk</td>
</tr>
</tbody>
</table>

When looking at the learning styles presented by Felder and Solomon, faculty can design classes to best incorporate the four categories. The following table shows some suggestions for these categories. [15]

Table 3. Suggestions for the Classroom for Felder & Solomon Learning Styles

<table>
<thead>
<tr>
<th>Learning Style</th>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active Learners</td>
<td>Create time for group discussion; have problem solving activities</td>
</tr>
<tr>
<td>Reflective Learners</td>
<td>Allow time for students to process material; have quiet time; allow students to rewrite notes or expand on notes</td>
</tr>
<tr>
<td>Sensing Learners</td>
<td>Present material giving real world examples; allow students to use their senses-to hear, touch and see what they are learning; use hands-on activities, computer-assisted instructions and materials that can be handled</td>
</tr>
<tr>
<td>Intuitive Learners</td>
<td>Present material with interpretations or theories that link facts; allow students to be inventive and original; let them experiment to find ways to solve problems; give choices in assignments</td>
</tr>
<tr>
<td>Visual Learners</td>
<td>Present material using pictures, diagrams, flow charts, time lines, films, videos, demonstrations, etc.; use concept maps for key points; color code concepts</td>
</tr>
<tr>
<td>Verbal Learners</td>
<td>Give students summaries or outlines of material; allow students to work in groups with discussion of concepts; allow students to present material with explanations</td>
</tr>
<tr>
<td>Sequential Learners</td>
<td>Present some material in a step-by-step sequential manner; give outlines of material</td>
</tr>
<tr>
<td>Global Learners</td>
<td>Explain how new topics relate to past material; give “big picture” perspectives on new material</td>
</tr>
</tbody>
</table>

4.2 Universal Instructional Design, Learning Styles and Technology

Universal Instructional Design has been used in many cases in preparing classrooms and material for the physically or mentally disabled. However, UID should be expanded to include learning styles as one of our major diversities. As we look at the seven UID principles, we can see how they can be used with learning styles to create a class that can accommodate all types of students. We can use the technology to help our hybrid and online courses to meet the accommodations needed for all learning styles. The next table shows each of the seven principles and suggestions for using technology to assist in the design of a well-structured course. [17,20]

Table 4. UID Principles and Suggestions for Implementation

<table>
<thead>
<tr>
<th>Principle</th>
<th>Suggestions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be Accessible and Fair – identical or equivalent means to fulfill course requirements</td>
<td>Create a website that has a variety of online resources so students can access materials in electronic formats as needed; use an accessibility checker to be sure students can access the materials; put material such organizers, lecture outlines, key points; use individual and group assignments</td>
</tr>
<tr>
<td>Be Straightforward and Consistent – the instruction to be clear and straightforward and that is consistent with expectations</td>
<td>Use a variety of strategies along with lecture, such as discussion boards, problem solving activities; use a variety of media – verbal, visual, audio, video, etc and design these to be used and reused in a variety of ways; post exercises and quizzes on the website so students can learn on their own; offer a choice in assignment format (reports, presentations, projects, etc)</td>
</tr>
<tr>
<td>Be Explicitly Presented and Readily Perceived – know that all students are physically or cognitively unable to access all media equally, so maximize clarity of each</td>
<td>Use tools that are intuitive; don’t use unnecessary complexity or distractions; be sure that test and quiz material relates directly to information covered in class or required material; give plenty of feedback – especially in areas of confusion; look at all materials for consistent formatting and give visual and cognitive cues</td>
</tr>
</tbody>
</table>
| Be Readily Perceived – know that all students are physically or cognitively unable to access all media equally, so maximize clarity of each | Use typed overheads or PowerPoint presentations for students; look at font types, etc in presentations; give a choice of file formats; ensure that web pages codes with HTML use <alt> tags for
2. Course: are suggestions that should be considered when planning your outlines, assessments, materials and activities. The following these types of courses – course planning and course delivery.

<table>
<thead>
<tr>
<th>Minimize Unnecessary Physical Effort or Requirements – look at the physical effort required to complete the course and eliminate anything that is unnecessary or not relevant to the learning process</th>
<th>Website should be accessible and minimize the amount of clicking, scrolling, or hunting for information; let students work on lab assignments either individually or in pairs or groups if the work is extensive; use features of Library on-line or WebCT for reading materials to access from anywhere</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensure Learning Spaces That Accommodate Both Students and Instructional Methods – all spaces must accommodate all learners</td>
<td>Have a variety of on-line activities that facilitate and encourage all types of learning styles</td>
</tr>
</tbody>
</table>

4.3 Planning and Delivering Your Course

After studying the various learning styles, knowing your own teaching style and understanding the principles of UID, time and effort then needs to be considered in preparing a hybrid or on-line course that uses UID principles and incorporates learning style technique. There are two major areas for development of these types of courses – course planning and course delivery. [20]

Course planning involves looking at the course goals, course outlines, assessments, materials and activities. The following are suggestions that should be considered when planning your course:

1. Clearly articulate your learning objectives for the course with their appropriate depth and identify the skills the course is intended to foster – such as research skills, written and oral communication skills, computational skills, team skills, leadership skills, computer skills, etc. Look at the timelines for all assignments and structure weekly activities that use a variety of different learning style concepts.

2. Make sure your syllabus and other material clearly communicates what the students are expected to learn and do in the course and what resources are available to them. Be clear about any prerequisites for the course, and include a detailed calendar when things are due. List any contact information for the instructor and any TAs and peers, including any lab assistants. List all resources and required and supplemental tests. Give all course policies, such as late assignments, class attendance, participation, missed assessments, academic misconduct, copyright, etc.

3. Ensure assessments are congruent with stated learning objectives and flexible in application, and that the criteria by which student work will be assessed are clear. Provide detailed grading criteria and rubrics. Allow students to use appropriate support materials so grades reflect what they’ve learned and not their ability to memorize. Use a variety of assessment activities to include all learning styles. Have both individual and group work. Describe the format of tests and other assessments.

4. Make course materials as accessible as possible. Have well laid out documents and provide a glossary of terms. Put electronic materials in a variety of formats.

5. Make the course website as accessible as possible. Make sure your website is as comprehensive as possible. Keep the navigation simple and avoid horizontal scrolling and minimize vertical scrolling. Ensure ease of readability by using appropriate font sizes, colors, and contrast. Use video and audio to help. Give good instructions on home web page.

6. Plan learning activities to maximize student learning through on-line and real-world resources. Provide questions to help students focus on reading material. Clearly articulate expectations for on-line conferences and chats. Simulate on-line a variety of active learning strategies (discussion, think/pair/share, role-play, case studies, debates, student led seminars, demonstrations, problem-based learning. Give recommended time frame for each learning activity. Incorporate real world learning activities.

Course delivery deals with orientation, organization, student prior knowledge, the development of learning skills, feedback, and content delivery.

1. Provide students with an effective orientation to the course, including teaching philosophy. Ask students to review all elements of the course and provide you feedback.

2. Bring organization and structure to the learning experience and to every resource used. Provide a detailed calendar for the course including all due dates. Summarize after each major topic and use visual cues to emphasize key information. Include summarizing notes on the website.

3. Assess and adapt to students’ prior knowledge, experience and learning preferences. Try to assess students’ incoming level of knowledge. Provide additional remedial activities. Have students share information about themselves and form heterogeneous groups based on this information. Have ways for collecting student feedback throughout the course.

4. Help students to develop their learning skills. Have students articulate what they want to learn in the course. Teach students about group dynamics to help them work better in group activities.

5. Provide students with clear feedback on their performance throughout the course. Use rubrics to shows how assessments are done. Provide clear, informative and prompt feedback. Use email to help students individually. Use password/protected websites for posting student grades.

6. In the presentation of material, use an interactive approach that is accessible to all students. Avoid special software.
Limit the number of concepts/topics covered. Include graphics, not just text. Highlight key concepts and label major sections. Provide examples or analogies for each concept. Use a variety of presentation media. [20]

If we apply all of these various concepts to the planning and delivery of our courses, taking learning styles into consideration, we can create a hybrid or on-line course that meets the needs of all of our students.

5. References