Standardized Templates Help Improve Accessibility and Usability Enhancing Transfer of Learning

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Background

Most academic leaders have concluded that online education is as good as or better than face-to-face and it is critical to the survival of their institution, since students who take online courses will continue to grow, (Allen & Seaman, 2014.) Due to the growth rate on online education courses, there is a greater need for consistency and standardization. To make online education successful across different platforms, it needs to follow Quality Matters (QM) standards, as well as to follow standardized templates.

In the 21 Century, most online courses use Web-2 technologies and mobile devices. No matter what technology is used, we need to take into account the human memory system capacity and working memory limitations, (De Jong, 2010; Paas, *et al*, 2003). This is especially important when placing elements on the screen, since these elements interact with one another and viewers process these interactions simultaneously. The more elements a viewer has in front at the same time, the more overwhelmed the sensory systems becomes and the higher the Cognitive Load (CL). The interaction between these elements becomes the manager of the CL. The use of standardized templates reduces system complexity, improving reliability, flexibility and maintenance; thereby, decreasing CL (Henry *et al,* 2008.)

Blended courses at Norfolk State University (NSU) require the completion of 22.5 online instructional hours. It is important to keep in mind that *all online* activities, no matter the course a student takes, pose the same cognitive demand on students' sensory systems.

Templates at Norfolk State University

Norfolk State University has adopted Quality Matters (QM) a faculty-centered peer review process that requires _standardization_ as part of their criteria. The United States Distance Learning Association (USDLA) has certified NSU and SACS has accredited NSU. To be **in compliance (and keep our certification and accreditation)**, the School of Extended Learning (SEL) developed standardized templates (i.e., shells) for various online purposes and practices, and thereby is the host and responsible for their standards, implementation and maintenance.

The Reason for Standardized Templates

Standardized templates arrange information that serves as graphic organizers, guiding students in the acquisition of unfamiliar information by providing an external "maplike" structure, which sets a pattern for internal organization that aids recall, (Aspillaga, 1992.) Using templates allow *schema acquisition*, these **schemas** will guide students where to look for a specific type of information when needed. This is important since working memory only allows students to hold a *few* interactions at the same time, whereas schemas are stored in long-term memory (LTM). The automation of these schemas can be processed unconsciously reducing further students' CL; thus, these schemas will be active, as they will be retrieved with every course as "prior knowledge". Information not retrieved from LTM decays; to be viable, it needs to be active, (Rosli, 2015).

Standardized templates are also arranged around the four principles that organized the web for accessibility, which are for navigational components to be **perceivable, operable**, clear and **understandable** by the user, as well as interpreted by a wide **variety of users** as technologies evolve making it **robust**, (W3C, 2015.)

Navigation and Standardization

Navigation is a major contributor to accessibility and ease of use. When navigation is well designed, it is intuitive and self-reliant; thus easy to use and understand. Although earlier menus structures preferred alphabetic organizations, a better approach employs categorization, where information is clustered into meaningful groups, (Bensley, *et al* 2006.) A well-designed navigation facilitates learning through its logical connections, associations, distribution, and delivery of information. Part of an intuitive navigation is its consistency and reliability.

Standardization provides *consistency* in the search for information, location of items, and search for patterns allowing users to learn the rules only <u>once</u>. For this reason, instructors <u>*cannot*</u> <u>*rename*</u> or <u>*move*</u> menu items to other sections; *(addresses QM section 6.)*. Consistency allows students to make *inferences* and *predictions* as to what path to take when searching for a <u>known</u> type of information or pattern.

Standardization through schema activation allows students to find information efficiently and effectively by keeping out non-essential components. Consequently, it reduces basic processing time and decreases confusion and frustration resulting in a cognitive load that can be handled effortlessly by the students.

Consequently, *standardized templates* based on principles of instructional design (i.e., QM standards) are some of the most reliable navigation systems. These will help students, access information in a uniform way; thus, having a uniform learning experience across campus, (Plott, 2010). By using templates, students will only have to learn the rules once. From there on, they only need to focus on the content as opposed to when using a different menu structure for each course, which adds extraneous variables, unrelated to the content that students' engage that take *important space* from their working memory to learn the rules from *each* course. If we remove these *extraneous* variables by making navigation constant for all courses, we reduce students' *extraneous* cognitive load, (Moreno, 2006.) Standardizing nonessential items decreases cognitive overload, allowing students to concentrate on the material. Hence, by working with *standardized templates,* the value of a single course increases as other courses have the same menu structure making it easy to navigate.

Template Design

The online courses that were in place prior applying *standardized templates* were *inconsistent* as to their menu structure; menu item's names were not the same on different courses even though they serve the *same* purpose and function, their location varied within the menu structure according to course and connections sometimes did not work. These items were not grouped into any category or section.

Menu Organization

In the **new** template design, the navigational area was organized according to **purpose** and **functionality**; this design helps ease of use, which is needed to support the learnability process among users, (Rosli, 2015.) Each menu was composed of <u>*four*</u> <u>*main*</u> <u>*sections*</u> or categories, (as seen in **figure** 1), guiding the user in the search, forming a schema of the menu; depending on the *type* of information is the categories the user will select to find data. Furthermore, integrating similar information into categories with a unique layout accounts for higher recollection, (Aspillaga, 1996), *(this addresses QM sections 1, 6, 7, and 8.)*

Within the content section, these menus offered <u>three</u> options that instructors could select from, when designing their courses: Weeks, Units or Modules; the only change instructors could make in any of these menu options was in the *content* section, the rest remained unchanged.

*Standardization **requires** that **__new templates__** remain unaltered, **_except_** for the addition of extra Weeks,* Modules or Units <u>within</u> the content area. The menu structure was divided as follows

Course
    Introduction
    Announcements
    Syllabus
    Faculty Information

Content
    Each Week's Content

Access and Interaction
    Ask the Professor
    Discussions
    Podcasts
    Meeting Center

Assessment & Resources
    My Grades
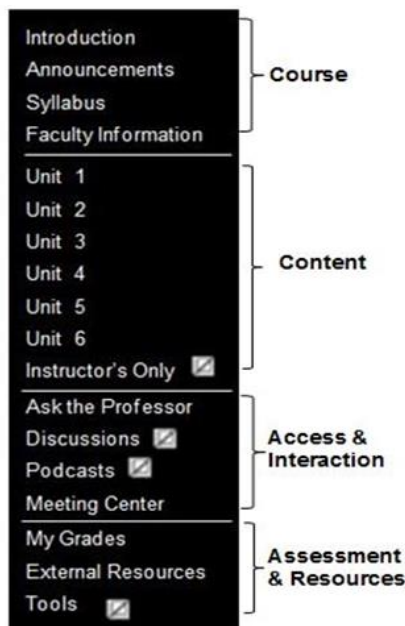   External Resources
    Tools

Figure 1 *Sample of a Standardized Template*

The design helps users make a mental picture of these categories (a schema) under which all menu items are found. Having this schema helps in the transfer of the menu organization to other courses that use the template.

Similarly, this design by sections reduces <u>extraneous</u> cognitive load (ECL), (i.e., information *interfering* with schema acquisition.) ECL is also described as a load imposed by content that could have been avoided with a different design, (De Jong, 2010), leaving more room for <u>germane</u> cognitive load (GCL), which are those variables that *enhance* working memory capacity, (Paas et al, 2003.) In this case, an increase in GCL is demonstrated by allowing students to focus on content by making the well-organized navigational area a *constant* on their learning, something they learn once; then, it becomes second nature to their learning process.

Drawing attention to the <u>content</u> instead of the unrelated aspects of the course, (i.e., the menu structure), increases students' working memory as students perform their search, by decreasing the amount of concepts, (e.g., menu items) students need to hold in working memory to process them, since these unrelated concepts (i.e., ECL) do *not* support any objective, (DeLeeuw & Mayer, 2008.)

Part of schema acquisition relates to the "**look and feel**" which remains *constant* for **__ALL__** courses; all menus need to <u>look the same</u> on <u>all</u> courses (i.e., black background with the same menu items on white fonts) decreasing ECL. Any **_change(s)_** in the look and feel becomes an *<u>attention-focusing</u> <u>device</u>*, drawing students' attention to that variation, increasing ECL.

To achieve consistency in the look and feel, it is important to get faculty on board; for this purpose, Plott proposed, for faculty who do not want to adhere by the use of templates to approach the LMS not as the template itself but as *"the framework for content delivery."*

Template Sections Purpose & Functions

Within each template, instructors can use many available sections, (i.e., content items) each with a specific purpose and function. Each section has its own **icon** helping students and instructors in the easy <u>search</u> and

identification of a section, since these icons serve as the logo for the section, enhancing relative recall for that particular section (Aspillaga, 1996.) As students focus on the icon for their search, they do not have to read all the content within that section for verification helping decrease student's cognitive load, which increases visual perception, *(Pérez-Moreno, et al 2011.)*

Icons are also a solution for students that have a problem relating a title related to the content of a section, since a title "may not convey to the user the same information as an image" (Bensley *et al.*, 2006) does. Moreover, icons assist those who require accessibility standards, for each icon has ALT text, as well as a *description for those who use a reader, (addresses QM standard, 8.1 & 8.3.)*

Each section has been designed based on QM Standards. Each course no matter the field of study looks the same and has the same font size and style. Therefore, instructors **cannot** delete or modify these icons, nor can they use these icons in **other** sections, (addresses QM sections 1, 6, and 8.)

*The following sections **need** to be in **all templates**, (addresses QM sections 2, 4, and 5*)

Required Sections

On each of the templates, there are four (4) **required** **sections**. This means the instructor **cannot** delete the **Introduction of Topic**, **Content Instruction**, **Lesson Objectives**, and **Required Reading** sections.

1. On the **Introduction of Topic,** the instructor *presents* to the class the topic that will be discussed, what s/he will be teaching that week.

2. On the **Content Instruction,** the instructor should *modify* the sample *text* to indicate what s/he will be teaching that week.

3. On the **Lesson Objectives** *section*, instructors tell students what they will be achieving that week in *performance* terms.

4. On the **Required Reading** instructors tell students the name of the text and chapter they will have to read for that week (under the required reading), as well as any suggested reading. Even though the book title is on the syllabus, instructors should **reenter** the title and chapter again on this reading item.

Under each menu item, you have several sections. For instance, under the following three menu items you find the following information and/or links:

Introduction (Start Here) *(addresses QM standard sections 1, 2, 7, and 8.)*

a) **Course Orientation**
   - *Course* Introduction
   - Course purpose & structure, *(addresses QM standard, 1.2)*
   - *Course* objectives (measurable, from St point of view—*addresses* QM standards, 2.2 & 2.3)
   - Prerequisites, (*addresses* QM standard, 1.6)
   - Course and institutional Policies, (*addresses* QM standard, 1.4)
   - Video (instructor self-introduction adding video script), (*addresses* QM standard, 1.8)
   - Discussion Board "Welcome" for St to introduce themselves, (*addresses* QM standard, 1.9)

c) University Resources *(including a link to an explanation of academic support help students, as per QM standard 7.3)*
- *Library (as per QM standard 7.2)*
- *Bookstore*
- *Services for Students with Disabilities (including a link to the disability office, as per QM standard 7.2)*
- *Scholarships and Financial Aid (including a link to the Financial Aid Office, as per QM standard 7.4)*
- *Blackboard Technical Support (as per QM standard 7.1)*

d) Technical Resources *(including a link to technical support and description of the technical support offered and how to obtain it, as per QM standard 7.1)*
- *Technical Contact Information*
- *Blackboard Support <u>Virtual</u> Help Desk*
- *OIT Client Services*

Faculty Information

a) *Instructor's Contact Information*
b) *Biographical Sketch*

Content Area
Content Arranged intro:
a) *Weeks*
b) *Modules*
c) *Units*

Unit Template

This template organizes content according to *Units*. Units are **containers**, a way of **grouping** content **<u>without</u>** any specific *sequencing control.*

This template is useful for content that is grouped into sections according to similarities, functionality, or other relationship; however, the instructor does not want to sequence their activities within the content.

When selecting a unit, a series of *instructional folders* in the form of weeks appear on the right side; each week's folder contains the *content* along with its activities for a specific lesson, as seen in **figure 2**.
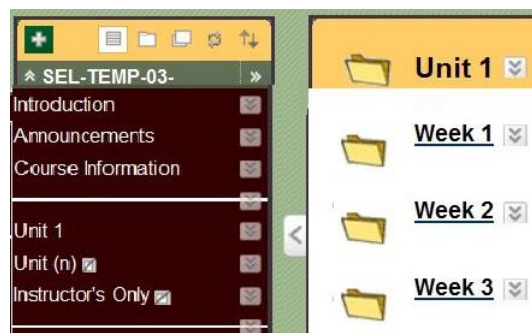

Figure 2: *Distribution of Content on Unit Template*

Accessibility

This template design also facilitates *accessibility. S*tudents who use assistive technologies or need to locate a menu item within the structure already <u>know</u> where to go—they learned the first time they used the menu; having items by the *same name* and, on the *same location* facilitates learning and enhances recall, it also facilitates ease of access. Thus, students can rely on the information being be easy to find, which decreases ECL and increases GCL (Henry *et al,* 2008.) (*Addresses* QM standard, 8.1)

Readability

Readable or clear text is accessible text. It is highly important to have accessible text because; it is likely that, within the next five years, all, if not a majority of higher education students would have taken at least one online course, (Allen & Seaman, 2014.) This makes it imperative to look at the way we display information on the screen. (*It also addresses* QM standard, 8.4)

The way material is presented is comparable to the way humans will internalize it and later recall and retrieve it. *Overcrowded* screens turn off many viewers; they feel discouraged by the amount of text in front of them and do not even attempt to start reading. Those who attempt to read the crowded screen will have to increase their mental effort to understand what is in front of them. It is important that instructors simplify screens, for as the mental load or effort of the student increases, the visual detection weakens, (Pérez-Moreno, *et al* 2011.) Instructors can simplify screens by doing the following

- Making **statements** <u>short</u> and to the point

- Making sure **Instructions** are <u>clearly</u> stated in <u>bulleted</u> form, in the order to be executed.

- **Adding space** in-between bulleted items (helps those with vision problems)

Other changes proposed by Schutten & McFarland (2009) are to

- Structure content **using headings**, **subheadings**, and **short paragraph**, (consisting of short sentences in the active voice with bulleted lists when itemizing)

- **Increase** the font size (size 12 font size is best)—Keep it consistent!

- **Avoid technical language** or *simplify* paragraphs that require it

- **Include anecdotes** to illustrate important concepts

- **Add graphics** to complement text

Some students understand descriptions, but others do **<u>NOT</u>** grasp the meaning of these descriptions, then instead they get the meaning or concept through a graphical representation or a video. For instructors, it is important to contemplate both audiences and provide explanations to those who need an illustration or a video and to those who need a short description. By adding text to graphics, you are also complying with accessibility standards.

Always have in mind that there are multiple audiences out there; as well as that the audience you might have has various levels of understanding.   You also need to provide a script and an audio form with accurate closed-captioned for diverse audiences. All technology available to students needs to have *clear* directions on how it is to be used. (*Addresses* QM standard, 8.2 and 8.3)

Text Alignment & Readability

Readability refers to the simplicity and ease with which a reader can recognize and comprehend written text. A well-written statement needs to respect the *natural* eye movements, which in the western culture are left to right and top to bottom. Screen text needs to <u>comply</u> by these natural laws to avoid adding extra pauses in places that these were not intended to, when reading the material, such as the case of all centered text, as seen in *Figure* **3**, or standard justified margins, which forces readers to do additional work distracting them from their focus, (Aspillaga, 1992.)

Figure *3: Centered Text- Disrupts eye movements.*

Font selection & Readability

Font selection is more important than ***color*** for highlighting information online; instructors can select a unique font style to highlight as opposed to a color that some may not be able to see. When a word is written in *upper* <u>and</u> *lower* case, it displays a unique **shape** given by the ascenders and descenders, which is highly <u>identifiable</u> by the reader, (Aspillaga, 1992,) as seen in **Figure 4**.
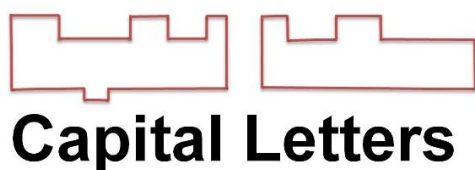

Figure 4 *"Word shape" displayed by text available in Upper and Lower case*

Humans read in chunks of information; however, when reading in **<u>ALL</u>** <u>upper</u> <u>case</u> the word ***loses*** its *distinctive* shape, as seen in **figure 5.** Therefore, it is harder to read when having text in all caps, for the shape becomes a *rectangle* of a different *length*—depending on the amount of characters the word has. And different words have the same shape, as seen in the words AT and UP, forcing the reader to read character by character to arrive at the meaning of the word.
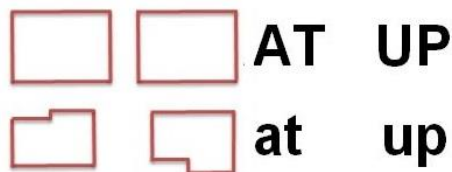

Figure 5 *Upper Case text is hard to read*

No matter the color of the text, its shape becomes available to the reader when using a combination of *upper* <u>and</u> *lower* case fonts.

Use of Space & Readability

Because shapes are made salient through the ascenders and descenders, the use of space is also highly important in the effects of readability and achieving QM Standards 8.4. By not compressing all lines and adding space in-between lines, instructors are making ascenders and descenders more relevant, thus the word shape more salient, (Aspillaga, 1992.)

It is also important to add **extra space** in between *ideas*, for it is easier for the reader to rest the eyes when grasping a single concept, each paragraph becomes a "group" as explained through Gestalt's "law of proximity."

> The **law of proximity**, according to Todorovic, (2008) suggests that when the user perceives a *collection* of objects (in this case paragraphs), the user will see objects close to each other as forming a group. The white space separating the two groups of text is used to indicate 'grouping', and the proximity of the paragraphs of each group is used for this purpose.

Following this same principle is placement of information. Consistency in the placement of information serves as a mental map that controls students' attention. When there is information of a specific nature, it is best to assign it a location and keep that location consistent for that type of information, (Aspillaga, 1996).

Colored Text

Similarly, when using colored text (especially red) to make a point, instructors are forgetting that many readers have color deficiencies and may *not* be able to read those comments or instructions. A person with a color-deficiency has trouble seeing red, green, blue, or combinations of these colors. The most common color-deficiency type is red-green: *Deuteranopia* where the viewer cannot see *any* shape of **red** and *Tritanopia*, where the viewer cannot see *any* shape of **green,** as seen in **Figure 6**. Twelve percent (12%) of the population has some variation of a color-deficiency. Designers and instructors need to have in mind this data when selecting font colors.

A- Normal Vision   B- Deuteranopia   C- Tritanopia

Figure 6 *Color deficiencies that affect learning.*

With today's software, instructors can select many font *styles* and *sizes.* They no longer need the use of *upper case* or *colored text* to highlight and make a point. If an instructor decides to use color text s/he need to provide an alternative means to *access* the same information in another way, for those who cannot read or access that content the way it is presented, (*addressing* QM standard, 8.3)

Standard 8.3, also applies when posting videos, which need to have a written script next to it or have Closed Captioning (CC), PowerPoint presentations that need to be narrated (i.e., contain audio and text), and graphic, pictures, and tables that need to have **ALT Text** and a description for readers and assistive technologies (AT).

Summary

A standardized navigation system grouped into categories provides students with an external structure that sets the pattern for internal organization, assisting in the transfer of learning, and accounting for higher recollection, (Aspillaga, 1992, 1996.) Having this schema helps transfer the menu organization to other courses with the same navigation and template.

This template design also facilitates *accessibility for* standardization provides *consistency* in the search for information, location of items, and search for patterns allowing users to learn the rules only <u>once</u>, facilitating ease of access, as students can predict where to go to find information, as they learned it the first time they used it, (Henry *et al,* 2008.) Templates work hand in hand with QM standards, allowing users to have a framework that already has all the standards in place. Now instructors only have to worry about their content; what type of content they should have for different populations, how they should display this content, and how to make it accessible to those who cannot see, hear, or select it as others can.

Font selection, font style, color, and usage, as well as location of information, the use of space, text alignment, and <u>consistency</u> are key to readability, making the material accessible. The appropriate use of each of these strategies promotes readability, decreasing *extraneous* cognitive load and at the same time increasing use of working memory effectively, which enables transfer into long-term memory, and supports transfer of learning into new situations.

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