Using Web-based Instruction to Aid in Term Identification
or
"Where did that term come from?"

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Abstract

One of the applications of web and browser-based instruction is the presentation of sample problems and their solutions. A concern with any presentation is that the information which can be presented is limited. Part of the learning process involves the identification of terms appearing in an equation. Some students have little difficulty identifying the source for a term, while others require more detailed assistance. Creating and presenting a single linear explanation can overwhelm the student having difficulty, and bore the student who grasps the terms more readily. A more reasonable approach involves the student passing the pointer over the term for a hint, and clicking for a more complete explanation.
This paper describes a simple and effective method for presenting the source of terms within an equation using browser-based tools that addresses the need of both types of students. It also describes a solution method that can only be provided by web-based instruction. Engineering Statics problems and their HTML code are presented as examples of this method.

Introduction

A common sight in the classroom is for the instructor to write an equation describing a situation that can be seen in an accompanying diagram. The instructor has, through years of experience, the ability to clearly visualize vectors and their components, and then write mathematical terms that describes them unambiguously. Students, though, do not yet have that experience, and therefore that ability. The instructor is usually presenting the term as a small part of the total solution. Students may be struggling with each term.

Description

The illustration below shows a sample problem and some of the lines that are displayed as part of the explanation.
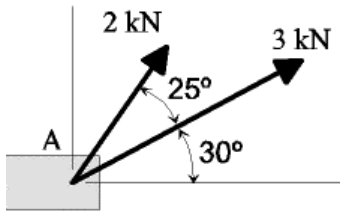
Two forces are applied at point A as shown. Determine the magnitude of the resultant.
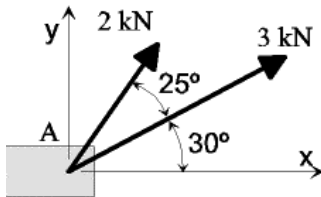
$$\bar{R} = \left(3\cos 30 + 2\cos(30+25)\right)\hat{\imath} + \left(3\sin 30 + 2\sin(30+25)\right)\hat{\jmath}$$

Not all students require the same amount of assistance. Even if a student is unsure of the source of a term, it isn't necessary to present a long-winded explanation to all queries. In particular, a quick visual hint is provided by passing the pointer over the term in question. For many, this may be all that is required in order to see the source of the term and how to interpret it. For others, though, a more complete explanation is necessary. Clicking on the term connects the user with a pop-up browser window that presents a thorough explanation.
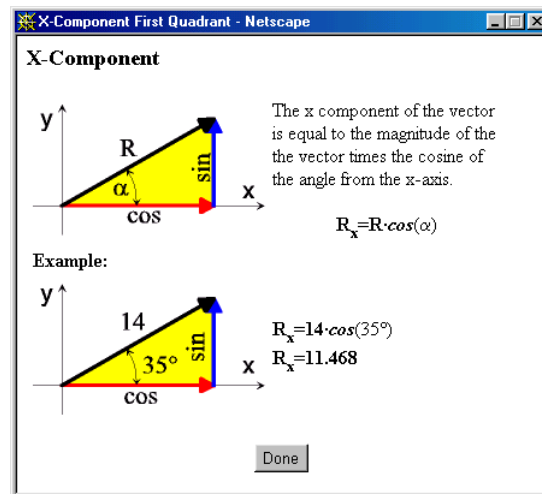
There are a few interesting implications for this work the least of which is the extra work required by the developer. The graphic is usually a vector-based computer file that is modified for each term. At it simplest this means that the developer must create a graphic for each term.
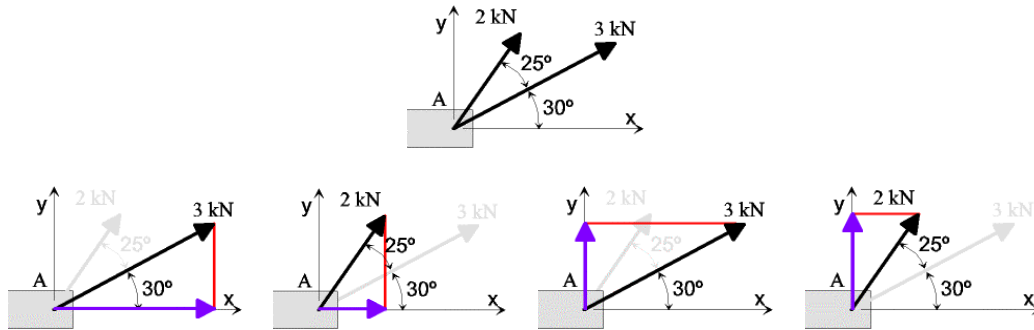
At its most complicated, though, the developer must create a detailed explanation for each term. The most difficult question here is where to draw the line in remediation.

HTML Code

The code to support this type of behavior is fairly simple. The developer examines the image with the terms in it using a program that displays coordinates. These coordinates are recorded and then used to generate the code segment shown below.

```
<IMG SRC="a01a.gif" USEMAP="#map1">
<MAP NAME="map1">
  <AREA COORDS="52,0,128,35"  HREF="http://A|/review/Q1x.html"
    onMouseOver="document.pic1.src='a01b1.gif'"
    onMouseOut="document.pic1.src='a01.gif'">
  <AREA COORDS="140,0,260,35"  HREF="http://A|/review/Q1x.html"
    onMouseOver="document.pic1.src='a01b2.gif'"
    onMouseOut="document.pic1.src='a01.gif'">
  <AREA COORDS="326,0,394,35"  HREF="http://A|/review/Q1y.html"
    onMouseOver="document.pic1.src='a01b3.gif'"
    onMouseOut="document.pic1.src='a01.gif'">
  <AREA COORDS="412,0,540,35"  HREF="http://A|/review/Q1y.html"
    onMouseOver="document.pic1.src='a01b4.gif'"
    onMouseOut="document.pic1.src='a01.gif'">
</MAP>
```

Benefits

If a link is used to provide a more long-winded explanation to the student, then that page must be developed along with any additional graphics. In reality, the limiting factor may be how to organize the pages and their supporting files. As a system becomes developed, and appended, more resources become available and other links are possible.

Conclusion

The mechanism presented is a useful addition to any web-based instruction system. Although it adds to work required of the developer, modifications can be made incrementally. Remediation can be an additional development providing the struggling student with a more thorough explanation of the topic. Incorporation of a user sensitive hint system can help the student in need of it.

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