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This is the 25th year of the journal's publication. With this release we have met a long-term goal of publishing a complete volume for direct distribution. Prior to this year we published piecemeal as articles were completed -- online only. We are moving to publish the journal twice a year, half a volume at mid-year and the other half at year end. The publications will be sent directly to members and posted on the AAPSE journal page (http://aapse.org/journal).

The editors appreciate the dedication and hard work of authors, reviewers, and the organization in supporting the journal. We are now in search of a contributing (legacy) editor. This individual will serve in this capacity and as AAPSE historian. Please contact the editor-in-chief if you are interested.

We are now seeking submissions for the 2024 Volume 26. We encourage you to submit your manuscripts to the editor-in-chief. Happy Holidays and thank you again.

Volume 25 – Table of Contents

Templates and Tools

Pesticide Applicator Certification Exam Readability: How to Estimate an Overlooked Test Characteristic

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Abstract

This article examines the practice of calculating a readability estimate on pesticide applicator certification exams, posttest construction. It reviews common readability formulas that pesticide regulatory agencies can apply to their test development activities. It provides details on two readability formulas available in Microsoft Word and how these formulas were implemented by a state pesticide regulatory agency to estimate the readability of that state's Core exam. The article concludes with recommended practices for estimating, evaluating, responding to, and reporting exam readability estimates.

Keywords: pesticide applicator certification exams, readability estimates

Introduction

Regarding fairness in testing, the *Standards for Educational and Psychological Testing* makes this observation, "Fairness concerns the validity of individual score interpretations for intended use" (American Educational Research Association et al., 2014, p. 53). Simply put, a fair, valid test is one where every examinee receives a score that is, to the extent possible, an accurate and precise representation of their true level of achievement.

A major threat to test score validity is irrelevant variance. The *Standards* are clear on this point: "A prime threat to fair and valid interpretation of test scores comes from aspects of the test or testing process that may produce construct-irrelevant variance in scores that systematically lowers or raises scores for identifiable groups of test takers and results in inappropriate score interpretations for intended uses" (American Educational Research Association et al., 2014, p. 54).[1] Consequently, exam developers attempt to screen out variables that have no relationship to the central focus of the exam and that might inadvertently advantage or disadvantage a group of examinees.

One source of construct-irrelevant variance includes "item complexities that are unrelated to the construct being measured" (American Educational Research Association et al., 2014, p. 54). This encompasses unnecessarily difficult item vocabulary, syntax, and punctuation. Item writers address this concern by drafting test

[1] Score variance refers to variability among scores within a group. Construct-irrelevant variance occurs when something causes scores to vary for reasons unrelated to the construct of interest. The construct in the case of pesticide applicator certification exams is achievement regarding job knowledge. Any other source of variability poses the likelihood of making items unnecessarily difficult (or easy) for some examinees.

questions that aim for brevity and clarity. However, the purpose of this article is not to review good item writing practice. Readers interested in that topic are encouraged to read, for example, Haladyna (2004). Rather, I intend to examine overall readability of a *completed* multiple-choice exam: how to estimate it, how to evaluate it, how (and when) to respond to it, and how to report it.

Readability: An Overview

Cognitive readability refers to the comprehensibility of text. “Readability is what makes some texts easier to read than others. It is often confused with **legibility** [physical readability], which concerns typeface and layout” (DuBay, 2004, p. 3).

Interest in, and how to objectively measure, readability has a long history. DuBay (2004) covers this in detail in his article. This paper offers a brief overview of common readability formulas, focusing on two in particular, and how to prepare a multiple-choice test to calculate a readability estimate.

What Are Readability Formulas?

“Readability formulas are multiple regression equations which predict the reading ability required to understand a given piece of text” (Ley & Florio, 1996, p. 8). Regression equations assess the strength of relationships between two or more variables. They consist of predictor variables and a criterion variable (i.e., the variable being predicted).

Readability formulas usually rely on two or more predictor variables of the following variety:

- Sentence length measured as average number of words per sentence.
- Word length measured as average number of letters per word.
- Number of words per sentence with a given syllable count.
- Number of common, or familiar, words per sentence.

The criterion variable is typically a measure of reading ability. Criterion variables associated with readability formulas are reading passages calibrated against readers of known reading ability. The criterion variable serves to validate the formula.

Differences among readability formulas are due to which predictor and criterion variables the formula author(s) selected (and the resulting regression coefficients). Reading estimates are either interpreted directly as a reading grade level or as a metric that requires a chart or a graph for interpretation.

DuBay (2004, p. 2) observes, “By the 1980s, there were 200 formulas and over a thousand studies published on the readability formulas attesting to their strong theoretical and statistical validity.” Readers may recognize a number of the following readability formulas: Dale-Chall Formula, Flesch Reading Ease, Flesch-Kincaid, Fry Readability Graph, Gunning Fog Index, and McLaughlin’s SMOG Grading. Ley & Florio (1996) regard these as commonly used reading formulas in the health care literature. Their application in this context is typically to assess readability of patient or client educational materials, product labels, and other technical communications, which arguably align with pesticide applicator certification interests too.

A Cautionary Note about Readability Formulas

In fairness, while widely used, well known, and popular, readability formulas have been the focus of a large body of critical research. Interestingly, these criticisms often stem, in part, from the very attribute of their objectivity (i.e., quantifiable predictor variables). For example, DuBay (2004)'s publication reviews the limitation of assigning variables relating to sentence length, word length, and familiarity as the primary basis of comprehension while failing to account for the contributions of text organization, content, coherence, and design. McClure (1987) illustrates this problem with an exaggerated example. She noted that one could apply a reading formula to a text passage and calculate a readability estimate, then scramble the word order in all of the sentences of that same passage, recalculate with the same formula, and derive the same estimate. Hyperbole aside, McClure did not intend an outright condemnation of readability formulas. Her perspective was that readability formulas should be understood as neither reading nor writing tools, but rather as evaluative tools. An evaluative tool in this sense is understood as a summative report. It documents an outcome, without any pretense of providing guidelines about how to reach a desired endpoint.

Another line of criticism examines what the reader brings to a reading exercise. Readability formulas cannot account for the reader's prior knowledge of text content, their interest in text subject matter, or their motivation to make sense of a written passage. These more subjective variables are well known to affect text readability vis-à-vis the individual reader (DuBay, 2004), but their absence from traditional formulas does not invalidate those formulas. Rather, such criticism serves as a reminder that the readability formulas have limitations.

Perhaps the most troubling problem regarding readability formulas is their lack of agreement when brought to bear on the same text passage (DuBay, 2004). In other words, two different formulas applied to the same text will likely yield two different grade level estimates. This should not come as a surprise given that the different formulas rely on different predictor and criterion variables. Regardless, what is of primary significance is that the individual formulas are consistent with respect to their predictive ability across a range of texts. Ley & Florio (1996) suggest applying two different formulas when estimating the readability of a given text. The user may then report the most difficult readability estimate or report the average of the two estimates. However, this author prefers to report both estimates and let stakeholders draw their own conclusion.

Regardless of the concerns described in the paragraphs above, the readability formulas are here to stay, and persons who write (especially in a technical capacity) are strongly encouraged to make use of them. "The formulas have survived 80 years of intensive application, investigation, and controversy, with both their credentials and limitations remaining intact" (DuBay, 2004, p. 57). Their application as an *evaluative* tool, post draft, offers writers an opportunity for feedback that they should take advantage of.

Flesch Reading Ease and Flesch-Kincaid Reading Grade Level Formulas

The two readability formulas that were used to estimate the readability of the state's pesticide applicator certification exam described later in this paper are the Flesch Reading Ease formula (Flesch, 1948) and the Flesch-Kincaid Reading Grade Level formula (Kincaid et al., 1975). They were selected because of their familiarity to this author and because they are available as a feature in the Edit function under the Review tab in the menu bar of Microsoft Word.

The Flesch Reading Ease (RE) formula is:

- RE = 206.835 – .846 wl – 1.015 sl
- wl = number of syllables per 100 words
- sl = average number of words per sentence

The Flesch Reading Ease formula was validated against the results of reading tests where children in the beginning grades through high school answered multiple-choice questions based on text passages commonly used in mid-20th century literacy studies. The formula yields a number between 0 and 100 with numbers approaching 100 indicating text that is increasingly *easy* to comprehend. Roughly speaking, an RE greater than 70 is an easy read, while an estimate below 50 is difficult. Table 1 translates the numeric result into verbal and grade level descriptions.

Table 1. Flesch Reading Ease scores expressed verbally and at grade level.

Reading Ease Score	Style Description	Estimated Reading Grade
0 to 30:	Very difficult	College graduate
30 to 40:	Difficult	13th to 16th grade
50 to 60:	Fairly difficult	10th to 12th grade
60 to 70:	Standard	8th and 9th grade
70 to 80:	Fairly easy	7th grade
80 to 90:	Easy	6th grade
90 to 100:	Very easy	5th grade

Adapted from DuBay, 2004

The Flesch-Kincaid Reading Grade Level (GL) formula is:

- GL = .39 sl + 11.8 spw – 15.59
- sl = average number of words per sentence
- spw = average number of syllables per word

The Flesch-Kincaid Reading Grade Level formula was derived from the earlier Flesch Reading Ease formula with the intent to simplify the original and yield a grade level estimate. It was developed for the U.S. Navy and validated against results of reading tests administered to service members based on passages from technical training manuals. The formula yields a number that is interpreted directly as a reading grade 1 - 16 (college).

A caveat is necessary at this point. Fry (1990) states that, regarding readability estimates of a given text, “Most formulas require a passage of 300 words or longer” (p. 594). Passage, in this case, refers to *continuous* text (or prose). This applies to the two formulas described above and the other common formulas mentioned earlier. Text passages this long are essential to allow for adequate sentence sample selection and improved estimate reliability. The next section of this paper addresses how to reformat a multiple-choice exam to ensure it can be sampled as prose – especially when relying on a computer to sample and calculate the readability of that text.

Preparing an Exam to Estimate Readability

Plake (1988, p. 550) notes, “Since readability indices are based on prose passages and a ‘traditional’ sentence, the routine applicability of readability indices [to multiple-choice exams] may not be appropriate.” Take, for example, this item:

1. The signal word that will appear on the label of a pesticide that is highly corrosive to skin, and eyes is ___.
    A. Danger
    B. Warning
    C. Caution

How many sentences should count here: zero, one, three, or four? (The answer is three, and an explanation follows.)

Plake (1988) offers a framework for reformatting multiple-choice items to read as complete sentences, but the framework is cursory. Woo et al. (2009) advanced a more detailed series of suggestions with respect to item reformatting. They recommend converting items to complete sentences with the following instructions. If the item stem is in the form of an incomplete statement and the options are sentence fragments, repeat the stem with each option to form multiple complete sentences. If the item stem is in the form of a complete sentence (i.e., a command or a question) and the options are sentence fragments, remove the options from analysis. And if the item stem is in the form of a complete sentence (i.e., a command or a question) and the options are complete sentences, include the stem and options in the analysis.

Woo et al. (2009) further recommend removing all tables, charts, figures, and diagrams from the exam prior to analysis. And Neuhoff et al. (2016) stipulated the need to remove all item identifiers before calculating a readability estimate, especially when the calculation will rely on a computer program. Item identifiers include any numeric or alphabetic sequencing that precedes item stems and individual options. This author has an additional reformatting suggestion based on practice – again, especially necessary when calculations will be done by computer. Remove the hard carriage returns (when the Enter or Return key is pressed) that follow the item stem and each of the options – except after the last one. This way each item will “appear” as a paragraph.

The following examples illustrate application of instructions for formatting multiple-choice items before estimating exam readability. The sample items are authentic. They are retired from the author's state Core exam.

Item in the form of an incomplete statement

1. The signal word that will appear on the label of a pesticide that is highly corrosive to skin, and eyes is ___.

    A. Danger
    B. Warning
    C. Caution

Reformatted

The signal word that will appear on the label of a pesticide that is highly corrosive to skin, and eyes is Danger. The signal word that will appear on the label of a pesticide that is highly corrosive to skin, and eyes is Warning. The signal word that will appear on the label of a pesticide that is highly corrosive to skin, and eyes is Caution.

Item in the form of a question with options that are sentence fragments

2. Which factor will increase the potential for off-target spray drift?

    A. Increased humidity
    B. Increased droplet size
    C. Increased wind speed

Reformatted

Which factor will increase the potential for off-target spray drift?

Item in the form of a question with options that are complete sentences.

3. What should be done first when a spill occurs near water?

    A. Contain the spill.
    B. Contact a supervisor.
    C. Report the spill to authorities.

Reformatted

What should be done first when a spill occurs near water? Contain the spill. Contact a supervisor. Report the spill to authorities.

Reformatting individual exam items permits the overall exam to be sampled as a text passage in order to more accurately calculate exam readability. Again, this applies to both readability estimates by hand and computer calculations. Neuhoff et al. (2016)

make this case clear with a specific example. They documented different readability results for the same certification exam when using Flesch Reading Ease calculated by hand versus by computer and where the exam was not reformatted for analysis. Consistency was achieved when reformatting rules were applied to the exam allowing for a common basis to sample multiple-choice exams as prose. Similar results were observed when they performed the same exercise with Flesch-Kincaid Reading Grade Level.

Application and Conclusions

The state pesticide regulatory agency whose exam development program provided the source material for this paper initiated an exam readability assessment on a Core test that was introduced in September 2020. The reason for this action was to develop a basis for comparison of the readability of the 2020 form of the Core exam with future Core test forms.

This state Core exam consists of 70 three-option, multiple-choice items. The minimum accepted passing score is 49 items correct, and 90 minutes are allowed for test administration. It is currently offered in a computer-based mode only.

The first step the pesticide regulatory agency performed before calculating readability estimates for the exam was to convert the exam from the test development software in which it was created to a Microsoft Word document. Subsequent reformatting required approximately three hours to complete, and rather than calculate the readability formulas by hand, calculations were accomplished in Microsoft Word. This function is available under the Review tab > Editor > Document stats.

The test was prepared for a readability analysis by reformatting according to the instructions outlined above. One additional measure was taken. The Core test includes an item set of 12 questions that relate to a simulated front panel of a pesticide product label. The panel was removed from the exam where, separately, it underwent reformatting with the intent of comparing its readability estimate with the readability estimate of the overall exam (i.e., items only). Reformatting the front panel of a pesticide label to appear as continuous text amounted to removing headings, subheadings, and anything that was not a complete sentence, including the entire ingredient statement.

The Flesch Reading Ease and Flesch-Kincaid Reading Grade Level formulas available in Microsoft Word were then applied to estimate overall exam readability (items only) and, separately, the associated product label front panel. Results are shown in Table 2.

Table 2. Results of two readability formulas applied to a state Core exam and accompanying reference material.

Readability Formula	Overall Exam Items Only	Product Label Front Panel
Flesch Reading Ease	51.5	48.8
Flesch-Kincaid Reading Grade Level	8.6	9.3

The Flesch Reading Ease formula indicates that the readability of the overall Core exam (items only) is fairly difficult (see Table 1 for interpretative guidance). The formula yields a similar result for the product label front panel associated with 12 items on the exam. The Flesch-Kincaid Reading Grade Level estimates a somewhat easier reading level for the overall exam (items only) and front panel (i.e., 8th and 9th grade levels respectively). Taken together, the formulas suggest that the exam and its accompanying label are comprehensible to examinees with several years of high school education.

At this point, an evaluation is in order. Are the readability estimates consistent with what the exam developer thinks is reasonably required to sit for the test? And what benchmarks exist that might inform an evaluation?

Plake (1988) attempted to identify appropriate external criteria to answer these questions. She stated, "The model for a thorough readability analysis of a licensure/certification examination should take the following dimensions into consideration" (p. 547). Paraphrased and with examples added, these include:

- Common written materials required for successful job performance (e.g., operator manuals).
- Labels and other instructions (e.g., pesticide product labels and labeling).
- Related licensure/certification exams (e.g., National Core test).
- Regulatory communications (e.g., EPA and state agency FAQs).
- Job-related reference works (e.g., pest identification and management guides).
- Exam preparatory study materials (e.g., training manuals).

I believe the two external criteria given above, labels and other instructions and exam preparatory study materials, are most practicable for the pesticide applicator certification community to use for an evaluative comparison.

Comparing overall exam readability (items only) with readability of product labels and labeling is undeniably appealing. The challenge it poses is that the literature is quite limited on the subject. This author located just one refereed article on pesticide label readability. Lockwood et al. (1994) calculated readability estimates on an unreported sample size of pesticide labels using the Fry Readability Graph and the Fog Index. Labels included herbicides, insecticides, and fungicides (restricted- and general-use products). They were reformatted in a manner similar to the recommendations described in this paper. Lockwood et al. (1994) found that for the labels analyzed, "The mean and mode cognitive reading level is the 11th grade" (p. 18).

Pesticide applicator training manuals are another source of meaningful comparison. This author believes there is no more productive evaluation to make than that exam readability aligns with the readability of training manuals. In this manner exam fairness issues, introduced at the beginning of this article, are reinforced, and linkages between the pesticide regulatory agency and the extension pesticide safety education program – managed in a way to minimize conflicts of interest – are strengthened.

Recommendations

A well-crafted readability analysis performed on a pesticide applicator certification exam is an excellent evaluative tool to help gauge whether the test is written at a level comprehensible to otherwise qualified individuals pursuing a license (i.e., ensuring that the test readability level is not an irrelevant barrier to success on the exam). State pesticide applicator certification and licensing programs are encouraged to calculate, evaluate, and report exam readability as another important test characteristic. Consider the following:

- Select a readability formula that meets the needs of the agency responsible for pesticide applicator exam development. Remember that most formulas rely on similar predictor variables. Choose one that is easily calculated by hand, or for which software is available that can perform the calculation.

- Reformat the exam following instructions provided in this paper. Reformatting creates a document that "appears" as continuous text (i.e., prose), a necessary requirement of common readability formulas. Failure to do so may lead to unreliable results, especially where computer software is used to perform sentence sampling and calculation functions.

- Recognize that a properly reformatted multiple-choice exam will yield a readability estimate for the *overall* exam. The resulting estimate should never be used to draw conclusions about individual items. Think of the estimate as an average across all items on the exam.

- Remember that readability estimates are not writing aids. They are evaluative tools, and any evaluation based on a readability estimate that attempts to gauge whether a particular text is too easy or too difficult for its intended audience is inherently subjective. External criteria that might serve as a benchmark are not easy to come by and typically provide limited guidance. Consequently, these formulas should never be used to rewrite an exam (i.e., writing to a formula) due to the likelihood of adversely affecting test characteristics. The best approach is holding test developers responsible for good item writing practice, calculating overall exam readability estimates, maintaining that information on file, and making it available to stakeholders, in report form, upon request.

Readers intent on revising an exam because of an alarmingly high grade level estimate are urged to proceed with caution. Never revise an exam that is currently in use. Doing so likely means triggering equal treatment concerns by altering test characteristics in a way that either advantages or disadvantages examinees who sat for the test before its revision. Rewriting a test should only take place at the point of next-to-last draft. The author recommends that this draft undergo careful review by a professional copy editor familiar with good item writing practice, especially as it pertains to clarity, brevity, and appropriate vocabulary load. A final review by a panel of subject matter experts is necessary to ensure that changes to the last draft maintain the intended meaning of each item on the exam. These suggestions are offered as a means of meeting basic tenets of exam development and administration.

This author's final recommendation is to encourage pesticide regulatory agencies to coordinate readability analysis of pesticide applicator certification exams with readability analyses of training manuals by their state pesticide safety education partners. This can, and arguably should, also become regular practice for regional and national exam and training material development projects. Every effort to explore how closely exam and training manual readability estimates align with one another benefits the pesticide applicator certification and training community and our mutual clientele.

Acknowledgments

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Program Description

Creation of a Digital Media Library to Support Pesticide Safety Education Programming

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Abstract

Virginia Tech Pesticide Programs has cooperated with the University Libraries at Virginia Tech to create an open repository platform within VTechWorks to house a digital media library to support pesticide safety education. The library contains images and short videos that can be downloaded and used when developing training materials. The library is available for use by anyone around the world, and contributions to its collection are welcomed from the greater pesticide safety education community. Additional information about how images and short videos can be included in the library, and the required information needed, are discussed.

Keywords: digital media library, open repository platform, pesticide safety education programs

Introduction

Pesticide safety education programs (PSEPs) offer a means by which the Cooperative Extension system can address the important issues facing pesticide applicators with the needed intensity, depth, and breadth required to achieve quality educational outcomes. However, for PSEPs to be successful, they must be provided with practical tools to conduct the issues-based, interdisciplinary programming required of them. Creation of a digital media library of pesticide-related images and short videos allows for easy sharing of educational resources between and among PSEPs, which is essential for development of high-quality and impactful programs that have a broad reach. A central repository for images and short videos can provide pesticide safety educators with the ability to more easily develop specific instructional materials for clientele. It can also make educational content more easily accessible to all PSEPs, eliminate the need to send files back and forth, allow for greater management of privacy and permission, and improve abilities to update and expand resources as necessary.

In fall 2021, Virginia Tech Pesticide Programs (VTPP) formed a partnership with the University Libraries at Virginia Tech to create an open repository platform within VTechWorks to house its digital media library (found at: https://vtechworks.lib.vt.edu/handle/10919/102775). Content within the library is organized by issue date, author, title, and subject area. Keyword and full text search also allow users to find relevant materials within the library collection. Because it is an open access repository, VTechWorks allows anyone around the world the ability to access and download content. In addition, content from the collection is indexed and discoverable through external search engines, such as Google Scholar. Our goal was to build a publicly available collection of high-quality images and short video presentations that could be stored in a central repository and shared among the greater PSEP community for incorporation into educational deliverables. The library allows for consolidation of digital media that would be of specific interest to pesticide safety educators and complements existing resources available on other publicly available platforms (e.g., bugwood.org, ipmimages.org). Although other online repositories for sharing of pesticide safety education resources exist (e.g., PSEP-IMI and PSEFMP), they are password protected and accessible only to educators affiliated with pesticide safety education programs at land grant universities. The VTPP digital media library has the potential to provide additional opportunities for building and broadening information exchange and collaborations among PSEPs, as well as other federal and state agencies, association groups, and industry.

How to Contribute to the Digital Media Library

VTPP welcomes others to contribute high-quality pesticide safety–related images and short videos (~ 60 MB in size) for inclusion in the digital media library. To submit materials, the contributor will need to request a new folder in VTPP's Library Submissions Google Drive. All digital media should then be uploaded to the new folder. Recommended file types for images include JPEG, PNG, GIF, WebP, IMG, BMP, and SVG. Recommended video formats include MOV and MP4. To ensure that all digital media adhere to FAIR (findable, accessible, interoperable, and reusable) data principles (Wilkinson et al., 2016), we ask that metadata also be provided for each contribution to the library. A metadata submission template was created to specifically guide this process and record the required information. Once these materials have been uploaded, contributors should then notify the authors, so that VTPP can begin reviewing, processing, and refining the content and metadata before inclusion in VTechWorks. VTechWorks' professional librarians also provide an additional layer of review to maximize findability and ensure that formatting is correct. Access to the VTPP Library Submission Google Drive and metadata submission template can be granted upon request to the authors.

Metadata Requirements for Digital Media

Required information within the metadata submission template includes the filename, contributor, contributor's affiliation, creation date, description, keywords, and preferred licensing.

- Filename – should be relatively brief (less than 50 characters with no spaces; underscores are fine) and adequately describe the topic and context (e.g., application granular).

- Contributor – the person who created the content in last name, first name order. If unknown, please leave this information blank.

- Contributor’s affiliation – a descriptive title of the university department, company, or organization that the contributor belongs to. If the contributor has no affiliation, then please leave this information blank.

- Creation date – the date the image or video was taken. This information should be in YYYY-MM-DD, YYYY-MM, or YYYY format.

- Description – a detailed description of the image or video (please keep accessibility in mind). All text in the description is searchable, so in-depth descriptions allow for search terms outside of the predefined keywords.

- Keywords – VTPP will fill in this portion of the template using keywords that fit into existing VTechWorks organizational schemes.

- Preferred licensing – how you would like your work attributed under a Creative Commons license (more information about Creative Commons license options can be found at: https://creativecommons.org/about/cclicenses). We hope most content within the digital media library will be under a Creative Commons (CC BY) license, allowing users to distribute, remix, adapt, and build upon the material in any medium or format, so long as attribution is given to the creator.

Conclusion

The digital media library was created to help pesticide safety educators more easily find images and video resources for the development of educational materials. The library provides easy access to content, unlimited storage space, searchability, and support services to ensure data security, fidelity, and backup. In addition, the library provides the ability to measure page hits, search terms, and downloads, which can provide insights into what content is being used most frequently and what subjects might need additional media content. Unlike other existing online pesticide safety education repositories, the VTPP digital media library is openly accessible with a focus on curating images for Creative Commons use. Because the open access component can be considered a disadvantage to some, content creators who want to limit accessibility may wish to consider other media repositories that require PSEP affiliation and login credentials.

The VTPP digital media library would greatly benefit from the contributions of other pesticide safety educators. The complementary but unique competencies of other PSEPs and related organizations can enable greater opportunities for the collection of resources with broad appeal and value and increase the impact of the library for all of its contributors and users. Over time, the library has the potential to provide greater access to a diverse collection of media in a variety of formats to further support pesticide safety education.

Acknowledgment

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Commentary – AAPSE Legacies and History

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This is the first of a life member tribute series in JPSE. These works will focus on the legacy associated with individuals who made an impact on the organization. This tribute reflects the incredible legacy of Dr. Mary Grodner.

Life Member - Tribute - Mary Lula Laslie Grodner

January 5, 1935, to September 5, 2012

- AAPSE Fellow
- AAPSE Life Member
- AAPSE Achievement Awards Winner- 1997, 1999
- AAPSE President – 1995 to 1997
- AAPSE Charter Officer – 1993 to 1997
- AAPSE Founder
- Emerita Professor, PSEP Coordinator, Louisiana State University

Cherished Friend, Colleague, Mentor

Dr. Mary Grodner was a pioneer entomologist and pesticide safety educator. Her contributions as a woman entomologist began in her early years at Louisiana State University (LSU), where she was hired as one of the first female agricultural specialists at the LSU AgCenter. Working in a profession dominated by men was tough, and she handled it well. Her director described her as a "test run for female specialists." He noted that she had passed this test with flying colors because she fit in with every crowd with ease and grace.

According to her colleagues, there was no man who could do better in working with pesticide applicators. Mary's people skills were legendary. Although some of those Extension audiences in the remote parishes of Louisiana were challenging, Mary earned their respect and friendship. Her work with the Louisiana applicator associations illustrates a lasting friendship with those groups. She was known affectionately for her brilliance, creativity, candor, and unique gift of telling entertaining stories that taught a lesson.

Having grown up on a family shade tobacco plantation, Oakdale, near Attapulgus, Georgia, Mary was quite knowledgeable of agriculture. She attended primary and secondary schools in Decatur County, Georgia, and Gadsden County, Florida. Mary graduated from Wesleyan College, in Macon, Georgia, in 1955 with a Bachelor of Science degree in biology. She received her Master of Science degree in zoology from LSU in 1957. While working on her master's degree, Mary met her husband of 53 years, Dr. Robert M. (Bob) Grodner, who was working on his Ph.D. at the time. They were married on August 22, 1959. Before the birth of her two sons, she taught at Otterbein College in Westerville, Ohio, from 1958 to 1960. When her husband became a professor in the food science department at LSU in 1963, Mary and the family moved permanently to Baton Rouge. While raising her sons, she received her Ph.D. in entomology in 1973, also from LSU. Mary continued her academic career as an assistant professor of zoology at LSU. She moved from that position to serve as a pesticide safety specialist for the LSU Agricultural Center as well as the longtime pesticide coordinator for the State of Louisiana.

During her service with the LSU Agricultural Center, Mary authored numerous articles that have been widely published. Being a sought-after speaker, she made hundreds of presentations on the national and state level regarding pesticide labeling and usage, and other technical matters. She was a member of numerous professional and scientific honor organizations, including Sigma Xi, Gamma Sigma Delta, the Entomological Society of America, the Association of Women in Science, and the American Association of Pesticide Safety Educators (AAPSE). Mary retired with over 35 years of service to LSU, the Cooperative Extension Service, and the Louisiana pest management community.

During this time, she was also a very active member of her church, serving as financial committee chairperson and as chairperson of the administrative board of University United Methodist Church. Mary also served in various capacities with the chapel choir, the Methodist Youth Fellowship, the 2 By 2 Sunday school class, and the JOY Sunday school class. Mary was a life member of the United Methodist Women. She was also a longtime member, past president, and past member of the board of directors of the LSU Kiwanis Club.

Over her long and distinguished career, Mary received numerous state and national awards. Those include awards from Gamma Sigma Delta, Louisiana Association of County Agents, American Society of Sugar Cane Technologists, National Association of County Agents, American Association of Pesticide Safety Educators, the LSU Agricultural Center, Louisiana Pest Control Management, and the Louisiana Mosquito Control Association. One of her favorite awards was the Distinguished Achievement in a Profession award from Wesleyan College, awarded to her in 1993.

Mary was a founding member of the American Association of Pesticide Safety Educators. Having hosted the first AAPSE meeting in New Orleans in 1993, she was elected to lead the organization in 1995. Her leadership solidified AAPSE's place as an international organization. Once again, her charm and wit captured people's attention. She helped AAPSE gain the respect of both industry and government during her years as its president. Her unique qualities as a gifted speaker and her ability to relate to people brought much attention to AAPSE. She was a class act. When Dr. Grodner came to the podium, people listened.

Mary was the mother of two wonderful sons and a dedicated and loving wife. Her family life revealed a well-rounded person; she was not only a larger-than-life figure professionally, but a very successful mother, grandmother, and spouse. An important part of Mary's legacy is that she was loved and admired by her family and friends.

In writing this biography, I asked members of AAPSE to tell how they felt about Dr. Grodner. Their feedback reflects much of what is stated here and adds an affection that is undeniable. Everyone loved Mary, and our organization was affected by her retirement. Here are a few comments.

- **Andrew Thostenson**, AAPSE president (2011-2013) -- “Mary had a zest for life and unshakeable conviction that pesticide education was a high calling and one that should be carried out with care and professionalism. There was never a closer friend or more respected colleague.”

- **Elmo Collum**, AAPSE member (2000-2015) -- “This lady will always be in my memory because of her grace, style, and compassion for not only her work but especially for her family, for which she was very proud."

- **Norman Nesheim**, AAPSE president (1999-2001) -- "Both Mary and I grew up in large families, but she grew up on the border of Florida and Georgia which was a very different environment and culture than northern Illinois. I enjoyed the many stories she told of growing up and the unique culture of the area and of the times. She gave a perspective of that part of Florida and an era that was unique."

Mary left each of us with a unique story to remember her by. She left AAPSE with direction, strength, and inspiration. Her example teaches us how to do our work well and how to conduct our lives.

Respectfully,

M. J. Weaver, AAPSE president (2013-15), charter (founding) member, editor-in-chief of the Journal of Pesticide Safety Education (adopted from an original post on AAPSE.ORG from September 12, 2012).

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