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# A CHRONIC CONDITION E-LEARNING MODULE FOR SCHOOL NURSES TO TRAIN AFTERSCHOOL TEACHERS AND STAFF

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This case presents the design and assessment (at the Interaction level) of a student chronic condition e-learning module. The module is to be used by school nurses as a traditional presentation aid/slideshow to support their on-ground trainings for afterschool staff on how to manage students with chronic health conditions participating in afterschool programs. However, it also serves as an interactive, one-stop-shop for more detailed education and information on the conditions (e.g., additional prevention and treatment materials, step-by-step emergency actions for staff during and after school, resources for more training and education). Trained teachers and staff can then spend post-training time at home reading and interacting with module materials to go more in-depth on the material that the school nurses presented. Also, the module was created to be viewed on mobile devices and tablets that afterschool staff would keep with them, possibly referring to them in real-time for prevention or emergency actions.

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## INTRODUCTION

Students with chronic health conditions or long-lasting, incurable illnesses need continuous management and possible emergency treatment for their conditions (National Association of School Nurses [NASN], 2019) during both school and after school time. Conditions such as diabetes, asthma, epilepsy, or allergies affect students overall wellness and development, consume numerous resources, and may lead to poor academic and social performance, as well as future health complications. Specifically, the ever-increasing number of students with chronic health conditions, many with multiple conditions, are at higher risk for school absence, low scholastic achievement, and poor school participation than those without such conditions (Lum et al, 2017). Most school districts identify, refer, and track students with such conditions. For example, nationally, about 10% of students have asthma, 8% have allergies, and close to 1% have epilepsy (Centers for Disease Control and Prevention [CDC], 2018). In one Midwest state of those school districts reporting survey results, almost 10% of students have asthma, over 2% have allergies, and about 1% have epilepsy or seizure disorders. The proportion of those students with asthma, allergies, seizures, and diabetes has markedly increased over the past 10 years (National Association of Chronic Disease Directors, 2015; Hines et al., 2016).

School health services, especially school nurses, provide the direct care, student advocacy, and medical and social service coordination to address chronic condition management, thus, improving student attendance and academic achievement as well as healthcare system cost-effectiveness (National Association of School Nurses, 2019; Leroy et al., 2017). Care coordination for these complex conditions, using health care plans and emergency action plans, is organized by the school nurse to meet student healthcare needs during school and in afterschool programs. Communication and sharing information with healthcare providers, parents/guardians, schoolteachers, and staff is an important part of the care coordination strategy to ensure students with chronic health conditions succeed academically. Just as important, though, is training and monitoring those staff

members in management procedures and emergency plans to reduce health and social barriers to learning (Hines et al., 2016).

School staff deal with increased numbers of students with chronic health conditions in the classroom. Teachers generally reported, according to a review, limited communication with school health services, lack of knowledge about the various conditions, and limited awareness of condition management and first aid procedures. Lack of confidence, concerns about liability, and perceived lack of skills also were barriers to meeting students' special health needs. In addition, due to lack of communication and training, teachers were receiving misinformation about various conditions from non-healthcare provider sources (Hinton & Kirk, 2014). In a systematic review, it was found, as well, that most public-school teachers were not aware of the national asthma management guidelines for the classroom (Jaramillo & Reznik, 2015). In a national sample of teachers using qualitative methodologies, participants expressed the need for more information about the conditions and how to successfully address them if they have to provide care (Selekman, 2016).

Both teacher and other school staff note the lack of resources and training, especially on school policy and staff responsibilities in chronic condition management, that contribute to frustration. Non-instructional and afterschool staff experience similar challenges as classroom teachers (Berger et al., 2018). Millions of students attend afterschool programs such as sports, clubs, and academic enrichment activities. Communication between school health services and afterschool staff about student chronic condition management is imperative in these settings (CDC, 2019). However, when a variety of school staff were surveyed, most were not aware of the barriers to optimal participation faced by students with chronic health conditions; they lacked knowledge of the association between health conditions and academic and social outcomes, and they perceived little support for addressing students with less common chronic conditions (Berger et al., 2018).

In a review, researchers identified the need for more school health services interventions to manage the large variety of student chronic conditions (Leroy et al., 2017). In a systematic literature review conducted by the CDC (2017), care coordination, specifically training school staff to address student special healthcare needs, was recommended to improve student health and academic performance. Educating staff about the association between health conditions and academic achievement, providing supportive interventions and resources, and encouraging their participation in e-learning professional development activities could assist students with chronic health conditions to thrive (CDC, 2017). For example, school nurses need to train school staff about how to follow care plans and emergency action plans as well as how to recognize asthma and life-threatening allergy symptoms and seizure onset. In addition, staff need training and professional development on how to provide care in an emergency situation (Hines et al., 2016).

School health services providers are expected to coordinate professional development activities for all school staff who support students with chronic conditions. Because of their healthcare expertise, school nurses are best suited to provide staff education to address these documented gaps. Using e-learning to overcome the barriers of time, remote settings, and limited budgets is also suggested as more research into the acceptability and feasibility of different types of trainings has been recommended (Hinton & Kirk, 2014). For example, use of e-learning technologies for school nurse professional development in diabetes management significantly improved participant knowledge (Rhodes et al., 2019). In a study of school staff, e-learning diabetes management education for school staff significantly improved participant knowledge, and participants were confident in their skills post-intervention (Taha et al., 2018).

## CONTEXT

The State School Nurse Consultant in a Midwest state came to us mid-summer with an urgent request. As a group of health education specialists in the college setting, we are always willing to help our health-related agency partners solve public health problems. She explained that school nurses are tasked with training afterschool staff in student chronic disease management and emergency plans and procedures, but they are generally given limited time and resources for providing afterschool staff with in-depth instruction and reinforcement of content. School nurses in the state asked the Consultant for assistance as school sports, extra-curricular activities, and afterschool programs would be starting soon. The Consultant asked if we could quickly create an electronic 'one-stop-shop' as a follow-up to the nurses' in-person, school-based afterschool staff trainings held before the start of the school year.

Our team of enthusiastic, but novice, designers answered the call. With access to an authoring program, plenty of energy, and no money, we aimed to meet the nurses' training need. The request was to create an e-learning module that could provide afterschool staff with in-depth content, medical guidelines, and emergency actions that was easily accessible and useful in the afterschool setting. It would be created in partnership with the Consultant, use reputable medical sources, and be reviewed by experts from the state school nursing association. Once created, the module link would be shared by the Consultant via email with all school nurses in the state just in time for fall afterschool staff training.

The timeline for completion, amount of in-depth content to be included, need for interactivity to meet different learning

styles, trainee accountability, and mobile access drove how the design was approached.

## DESIGN AND ASSESSMENT PROCESS

The purpose of this design project was to create (and secondarily to gain feedback for design changes at the Interaction, or initial pilot, level) a chronic condition e-learning module to support school nurse training of afterschool staff. School nurses, as an integral part of school health services, coordinate care for students with chronic conditions, including training staff members during and after school to provide condition management and emergency support. Online training has been recommended to overcome time and resource barriers to effective education as well as to meet documented staff learning gaps.

### Design Process

Our team developed this e-learning module through a series of phases, following the ADDIE (analyze, design, develop, implement, evaluate) approach for instructional design (Branch, 2009).

*Phase 1: Analyze*

After receiving Institutional Review Board approval, we, the health education specialists, researched evidenced-based content, best practices in student chronic disease management, state, and national guidelines, as well as national association and government-based training resources for the following chronic conditions affecting that state's school students: asthma, seizures/sickle cell disease, diabetes, and allergies (latex/stings/food). A nationally certified school nurse and the state school nurse consultant continually vetted the content and resources for medical accuracy and appropriateness for use by afterschool staff as well as providing feedback throughout the development process. Much of the pre-design analysis was provided by the Consultant, as this was a requested project.

*Phase 2: Design*

After gathering the necessary and relevant information, our team decided to create an e-learning module for each of the five chronic health conditions, each with a narrow scope to keep information chunked appropriately and allow for ease of access to the material. The modules were generally designed to be an interactive, one-stop-shop for more detailed education and information on the conditions that could be used as a training tool and accessed quickly at a time of need. A general-to-specific approach was used when preparing information to be included in each module.

*Phase 3: Develop*

Once the content was selected and design was established, we used Articulate's Storyline 360, an authoring program, to create the interactive e-learning modules for each of the chronic conditions. Articulate's Storyline 360 authoring tool allows for prototyping, designing the module to work on multiple devices, obtaining frequent feedback from stakeholders throughout development, using interactivity features, and evaluating the structure (Andriotis, 2016).

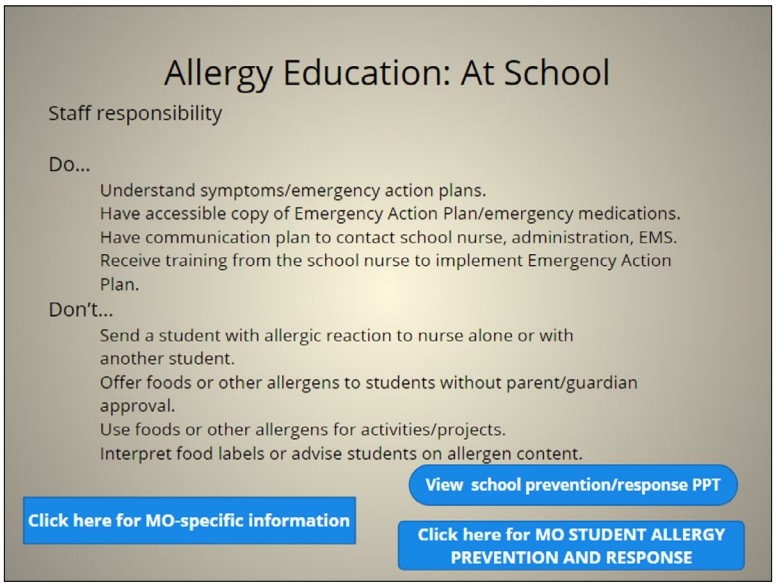


**FIGURE 1.** Basic information is provided on the main page, while more information specific to the state is provided with clickable buttons.


**FIGURE 2.** Clickable images to outside sources in the seizure module.

Each module begins with a title page introducing the disease to be discussed, and a suggestion to view the module with sound. The modules all follow the same general sequence, wherein the module begins with an introduction to the disease and is followed by information on prevention and treatment, step-by-step emergency actions for staff during and after school, and resources for more training and education.

Each module contained curated curriculum at different levels of complexity. The Consultant decided that the school nurses needed guided content for their trainings, and the team noted that afterschool staff wanted easily accessible prevention and emergency resources. Therefore, the more basic information was provided on the pages directly, allowing the school nurse to introduce this information while conducting trainings, and the more complex information was provided on a separate page, accessible through a navigational button. This is represented in Figures 1 and 2, in which outside websites with additional information on each topic are linked with clickable buttons and images.

The team decided that the modules should be designed similarly in format to one another so that afterschool personnel would gain familiarity with the e-learning module structure and gain confidence with the technology. In addition, afterschool staff were already familiar with slide shows and other media from their school-based occupations; therefore, combining a slide show format with multi-media elements was utilized to enhance familiarity.

The modules were created to be viewed on mobile devices and tablets that afterschool staff would keep with them, possibly referring to them in real time for prevention or emergency actions. As a resource for many situations, the modules support prior training received from the nurses. The unique setting of a school site as a worksite, targeting content and format to staff as both employees and student mentors, also drove design decisions. Figures 3 - 5 represent slides from the allergy, asthma and sickle cell disease e-learning modules designed to be used by afterschool staff during a time of need. The images and steps to be taken are clearly identified, and, on the allergy slide, lead to a page with emergency steps to take if needed.

Many modules used clickable images and buttons to access additional information (Figures 3-5). In the diabetes module, however, we utilized a grid format to present both educational material and actions to be taken. This was done in an effort to strategically present a lot of critically important information in an organized fashion. This is represented in Figure 6. Overall, afterschool staff will be able to access one page to learn more about a variety of diabetes-related topics and concerns.


**FIGURE 3.** Specific allergens are depicted, with clickable images for afterschool staff to quickly and easily identify necessary actions in the event of exposure.

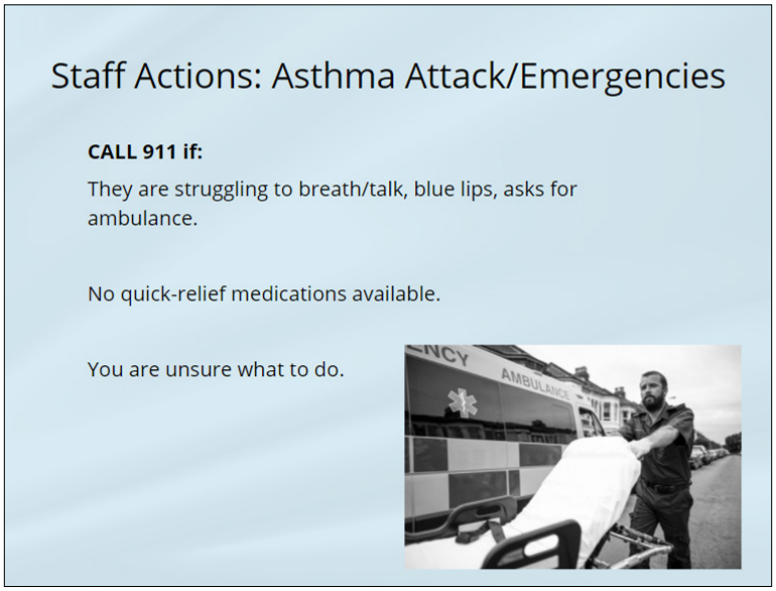


**FIGURE 4.** Specific symptoms requiring emergency treatment are clearly stated on the asthma module.

Visually, the images used on most module slides depict children (applicable for the school setting) or those for whom the information is most relevant. This decision was made as our primary users are school nurses and afterschool staff in an elementary/middle school settings. Specific to the sickle cell disease module, most images represented African Americans, as sickle cell disease is most prevalent in African

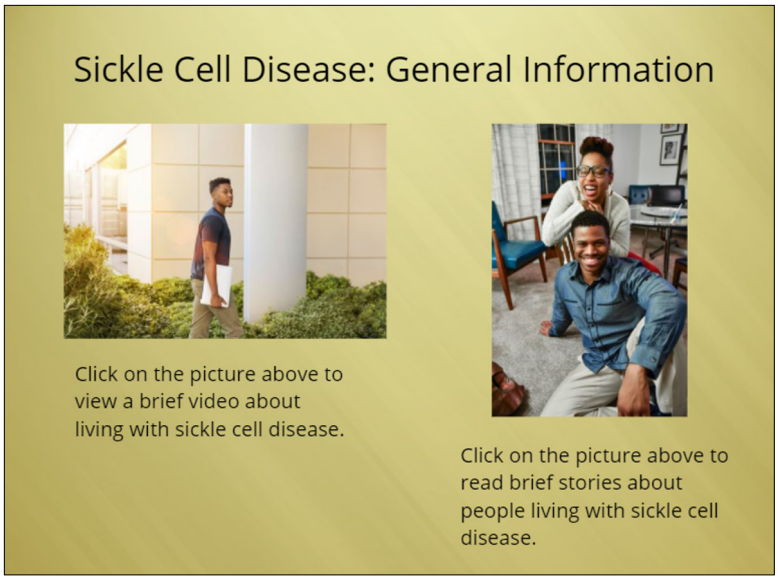


**FIGURE 5.** Clickable images for the afterschool staff to learn more about living with sickle cell disease.

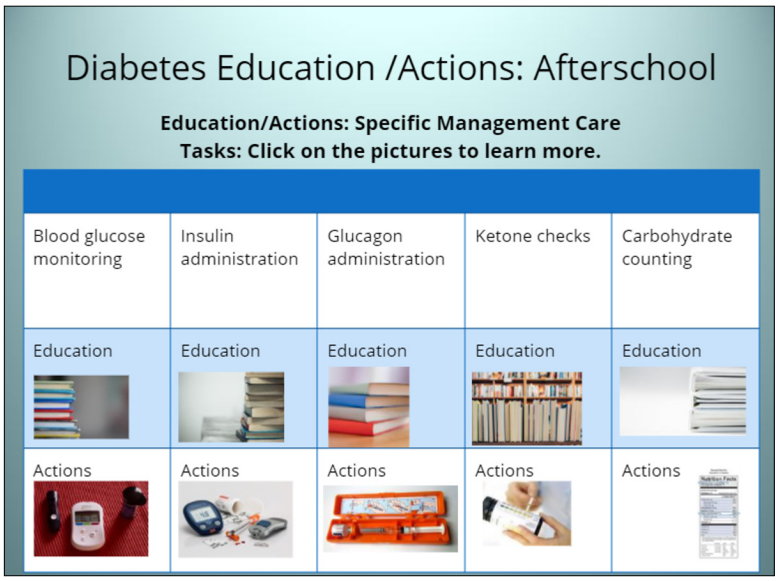


**FIGURE 6.** A grid of clickable images for specific management care topics in the diabetes e-learning module.

American and Hispanic individuals. Each of the images used in the modules was freely available for use in Articulate's Storyline 360.

The background colors for each module were selected to maintain a neutral, yet welcoming tone. Being useful and appealing for our users was a goal in developing these modules, so color choice was important for us in this process. All modules used a neutral or pastel colored background with black font, and bright buttons/clickable links to stand out (see Figure 1 for example of contrasting button color).

A basic San Serif font was used for all modules, as is best practice for accessibility. The modules included some medical language, but effort was made to ensure all modules were presented for users at a basic literacy level.

The designers expected learners to interact with the modules for more in-depth information during their free time and at their own pace. To support traditional in-person training, and at their office or classroom computers, learners could access the modules, stop if they are interrupted, and go back to where they left off to continue. The designers also expected learners to access the modules on their mobile phones or tablets in the field. Learners could refer to the modules for consultation when they forgot a point or needed information in real time, especially during an emergency.

*Phase 4: Implement*

Each module was introduced to the afterschool staff following an initial presentation from the school nurse. In this initial presentation, the school nurse led the group through the module, introducing general topics and guiding navigation. Then, afterschool staff were provided the e-learning module links and required to go through the module on their own and in greater depth at home. This two-step method of presenting the information allows a second exposure to support knowledge retention, as well as an opportunity for more hands-on learning. The asynchronous nature of the second exposure allows afterschool staff to fully dive-in with the material and explore the module completely.

*Phase 5: Evaluate*

Because learner time is limited because of their in-school and after-school activity responsibilities, very brief, non-graded, pre-assessment quizzes were included in the modules. With time and work as stressors for these afterschool staff, too much evaluation or testing may have led to more stress and discouraged use of the modules. However, only the final page for each module included a formal knowledge assessment and an opportunity to print a certificate of completion upon conclusion. This design feature is included to ensure learning has occurred and to provide school nurses with verification of participation with the module.

## Assessment Process

As more staff trainings are moving from traditional in-person methods to e-learning strategies (i.e., online trainings, video chat software), the e-learning environment forces some changes in training evaluation techniques. To accommodate

| | N | M (SD) |
|---|---|---|
| The module is easy to use. | 81 | 4.3 (.99) |
| The module is useful for afterschool staff. | 82 | 4.4 (.86) |
| The module is visually appealing. | 82 | 4.2 (.95) |
| The module is well organized. | 82 | 4.3 (.94) |
| I am always able to find useful resources on the module. | 82 | 4.3 (.93) |
| I could use the module during most chronic disease trainings with my afterschool staff. | 82 | 4.1 (1.07) |
| The variety of resources in the module is satisfactory. | 82 | 4.3 (.87) |
| I am pleased with the number of resource options. | 82 | 4.3 (.95) |
| I am satisfied with the module. | 82 | 4.2 (.92) |
| I would recommend the module to other school nurses. | 82 | 4.4 (.89) |
| *Note. All scales ranged 0-5.* | | |

**TABLE 1.** Results of e-module usability survey.

e-learning strategies, an adapted version of Kirkpatrick's model for evaluating training was created. The adapted model, more relevant to the e-learning environment, includes three levels [Interaction, Learning, and Results] and accompanying questions to determine training value and effectiveness. In the initial stage of e-learning module design, the objective of the Interaction level was to evaluate learning opportunities and module navigation. A survey was created to evaluate school nurse participants' perceptions of the module at the Interaction level (Hamtini, 2008) about appeal and usefulness, feasibility of use, satisfaction, and organization and navigation of the module. The last four questions, open-ended, asked respondents to comment about any improvements and other feedback related to use of the module.

We asked lead school nurses in the Midwest state to evaluate learning opportunities and module navigation Eighty-two of the 91 lead nurses (91%), an extremely high response rate, agreed to participate.

Items from the Survey were analyzed to assess utility and nurses' perception of the module. Mean scores were computed for each of the 10 rating-scale items, while the open-ended questions were assessed qualitatively. These scores are presented in Table 1. Highest scores were for perceived module usefulness for training their afterschool staff as well as recommending the module to other school nurses. The relatively lowest score (4.1/5.0) was for participants using the module during trainings with afterschool staff.

## FAILURE ANALYSIS

Any design suggestions were acted upon, and changes were made. The lead school nurses suggested the inclusion of some elements that we did not integrate into the initial design. We should have consulted more school nurses from the beginning. This is where we missed the mark, but we did uncover our mistakes during the assessment process.

When asked in an open-ended question to describe the parts of the module they felt were most beneficial, 61 (74%) responded. Response themes included: usefulness and comprehensiveness, interactivity for a variety of learning styles, resources, and all information is in one place. The positive feedback provided for this question reaffirmed our inclusion of interactive features and content on a single page.

### Design Failure

Fifty-two respondents (63%) responded to the question regarding improvements that could be made to the module. Most responses, though, provided no suggestions for change. This may be due to respondents seeing no changes needed, lack of willingness or time to respond, or not wishing to be negative. We really would not know unless we conducted a follow-up. Of those who did suggest improvements, changes were centered around the themes of: too much information included, a need for a table of contents, a need for a post-test, and some navigation was tricky. This information was useful in making some necessary adjustments. First, a post-test has now been included for each module. Additionally, some navigational changes were made, specifically making images and buttons clickable to

move to sub-pages. A table of contents is being added to e-learning modules moving forward.

When asked to provide additional feedback on module design, 41 (50%) responded. Similar to the previous question, most did not provide concrete suggestions. Those who did provide feedback suggested the following: post-test or training documentation for school nurse monitoring, having better visual appeal, making the module more user-friendly, and reducing the amount of information included. There is conflicting information regarding the amount of information on the pages. This may have been due to poor organization or flow of the material. Some may have missed information that was included, and some may have viewed pages as too complex. Therefore, not much has been modified outside of the inclusion of sub-pages with more complex information. A post-test with certificate of completion has been added to address concerns of documentation. With regard to visual appeal, discussion of modifying certain pages is ongoing.

### Usefulness Failure

The lead school nurses were also asked to provide information on their perceptions of the usefulness of the modules, and 46 (56%) responded with suggestions that included: good information for later/home, good resource, will use with not only afterschool staff but also other school staff, and would like a post-test to document training completion for nurses monitoring staff. As previously mentioned, we added a post-test with these e-learning modules.

## CONCLUSION

Staff training and monitoring is an important part of care coordination provided by school nurses for students with chronic health conditions (Hines et al., 2016). Both teaching staff (Hinton & Kirk, 2014; Selekman, 2016) and other school staff (Berger et al., 2018), however, previously reported knowledge, confidence, and skill gaps in meeting these students' special healthcare needs due to lack of communication and training. Educating staff using e-learning professional development activities has been recommended to overcome time, financial, and resource barriers to training (Hinton & Kirk, 2014). This case depicts the creation of an e-learning module to train afterschool staff as recommended, suggesting respondent appreciation and potential use of the module for educational purposes. Initial participant evaluation demonstrated high satisfaction with ease of use, organization, resources, and potential for training afterschool staff. Possibly, as the module is more widely implemented, staff knowledge and confidence will improve similar to results of other online training studies (Rhodes et al., 2019; Taha et al., 2018).

Much was learned about design throughout the process. Tailoring the design and format to use multi-media elements that the target audience was familiar with, keeping in mind this audience's time and stress levels as they work both in and out-of-school, and making changes according to their feedback were found to be important in the step-by-step design process. High ratings by participants of their agreement on interface utility, appeal, information usefulness, and learner satisfaction were possibly due to following best practices for the development of e-learning programs, especially focus on continuous stakeholder feedback throughout the process (Andriotis, 2016). In retrospect, we should have not only taken into consideration expert opinion initially but also consulted the grassroots experts in the field, allowing us to see all viewpoints. In addition, possibly because of time constraints and beginners as designers, disorganized and mismatching buttons were used. This glaring mistake will be addressed in the next version.

This module is intended to be used by school nurses of all levels, and other afterschool staff; however, at this point, opinions/perceptions of module use have not been asked of non-lead nurses and afterschool staff members. The opinions of these additional staff members will be gathered at future data collection.

The next steps are to implement module state-wide and evaluate more (Hamtini, 2008). For staff who use the module during and after school nurse training activities, learning level evaluation should focus on their pre-post knowledge, confidence, and skill acquisition; and Results level evaluation should focus on their application of the acquired knowledge through school nurse monitoring and review.

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