

## Developing E-Learning Module To Aid In Student Learning

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| KATA KUNCI  | ABSTRAK   |
|---|---|
| Educational technology;<br>Experiential learning;<br>Nursing education;<br>Self-directed learning | Self-regulated e-learning modules are an innovative teaching method to increase student success and results in light of the desire to include technology in nursing education and the rising demand for online training. According to a learning requirements analysis, adding a self-directed, self-paced e-learning module might give students a way to more adequately prepare for a scenario simulating pediatric dehydration with medium realism. Three faculty members—a faculty topic specialist, a faculty content consultant, and a librarian/instructional designer—were assembled into a collaborative, interdisciplinary project team. Using the notgulated learning, the team created an online learning module. The purpose of this module is to prepare better and to prepare undergraduate nursing students for pediatric simulation better us, a standalone, self-paced supplement. Including an online learning module will improve student engagement with the subject matter and encourage more excellent self-directed learning.<br><br>This is an open-access article under the <a href="#">CC-BY-SA</a> license. |



### Introduction

The usage of e-learning to support effective student learning outcomes has expanded due to the constant demand for online teaching and the desire to incorporate technology into education (Chang et al., 2021; Kowitlawakul et al., 2017). E-learning, as defined by McDonald et al. (2018), is the use of information and communication technology (ICT) to provide web-based, computer-based, digital, or online learning (Männistö et al., 2020; McDonald et al., 2018; Najafi Ghezalje et al., 2019; Vandenberg & Magnuson, 2021; Wang et al., 2021; Wittenberg et al., 2021). A self-directed learning tool can be created in an e-learning environment and then completed at the learner's speed (Chang et al., 2021; Kowitlawakul et al., 2017).

According to Paquet and Marchionni (2015), e-learning content may be reviewed as often

as necessary to create a secure learning environment. In addition, most curricula may readily incorporate e-learning modules to enhance better learning outcomes (Kowitlawakul et al., 2017), (Chang et al., 2021). ICT aims to increase students' motivation and engagement in their learning, which will result in the development of abilities for lifelong learning (Briscoe & Brown, 2019, hal. 186), (Wu et al., 2023, hal. 2244); (Zimmerman, 2002, hal. 64–70), (Halverson & Graham, 2019, hal. 145), (Johnson et al., 2023), (Saint et al., 2022), (Brenner, 2022, hal. 1–14). The following essay details a collaboration between nursing professors and a librarian/instructional designer to create an online course that teaches students about fluid tonicity in pediatric patients.

This e-learning module was created using the framework provided by the theory of self-regulated learning (SRL). Self-regulation is defined as the "self-directed process by which learners transform their mental abilities into academic skills" (Chang et al., 2021; Halverson & Graham, 2019; Johnson et al., 2023; Kowitlawakul et al., 2017; Saint et al., 2022; Zimmerman, 2002). This approach emphasizes how crucial it is for students to actively participate in their own learning. Self-directedness, self-efficacy, self-awareness, self-reflection, and self-motivation are only a few of the crucial processes that help people learn (Chang et al., 2021; Halverson & Graham, 2019; Johnson et al., 2023; Kowitlawakul et al., 2017; Saint et al., 2022; Zimmerman, 2002). In order to improve clinical reasoning and metacognition in nursing students, it is crucial to construct their education from this theoretical framework (Brenner, 2022). According to a comprehensive study, nursing students who establish self-regulated learning techniques are more likely to be competent nurses who provide higher-quality care (García-Ros et al., 2018).

Forethought, performance, and self-reflection are the three steps of the SRL learning process (Cleary & Zimmerman, 2012). Task analysis and self-motivation are the components of the forethought phase. Strategic planning and goal-setting are included in this phase. Then, self-motivation beliefs influence how learners approach the work, set goals, plan methods, assess their interest in the activity, and finally complete it to the desired performance level (Panadero & Alonso-Tapia, 2014; Zimmerman, 2002). This cycle also incorporates individual self-perceptions of efficacy, individual self-perceptions of task difficulty, and the importance of learning.

The self-control and self-observation processes make up the performance phase. Self-instruction tactics are outlined in this step; these are often chosen in the planning phase. Self-observation comprises self-assessment of the learner's development and self-monitoring of time management and another study (Cleary et al., 2012).

Self-judgment and self-reaction are both a part of the self-reflection phase. In this stage, the learner evaluates their performance in light of the evaluation criteria and the intended outcome. The cyclical process starts by considering what techniques have and have not worked if the learner does not reach their objective. v (Teng et al., 2022). The SRL cycles are followed by

metacognitive awareness, essential for constructing and finishing the phases (Bembenutty, 2023). Students should be encouraged to create objectives, assess their progress, and have self-awareness to modify their learning tactics to attain these goals. The SRL process may be mastered. The need to help pupils comprehend that learning is not the same as "being taught" is emphasized through this procedure. Learning is a self-directed activity that calls for self-awareness, self-monitoring, and self-motivation (Cleary et al., 2023).

Students can learn independently thanks to e-learning modules, which allow repeating parts for clarity. There is a knowledge gap in nursing education regarding the use of conventional and e-learning modules to enhance student learning outcomes (Liu et al., 2021; Männistö et al., 2020; McDonald et al., 2018; Tiedt et al., 2021; Vandenberg & Magnuson, 2021; Wittenberg et al., 2021). Research has indicated that for this learning technique to replace the typical classroom learning environment successfully, motivation is essential for student involvement (Kang & Zhang, 2023). Pence and Suerth employed one motivation subscale and three learning strategy subscales from the Motivated Strategies for Learning Questionnaire (MSLQ) to evaluate motivation and cognitive SRL usage in a recent study on 65 millennial senior prelicensure baccalaureate nursing students (Pence & Suerth, 2020). Pence and Suerth discovered that during studying, students used three fundamental and sophisticated cognitive SRL processes (rehearsal, elaborations, and organizing).

The usage of SRL was favorably related to increased study time and GPA scores. According to the study, giving practical learning opportunities after imparting basic knowledge might encourage students to consider and practice what they have learned. Additionally, Irvine et al. discovered that nursing students had low self-efficacy and moderate levels of SRL (Irvine et al., 2021). By encouraging students to be self-aware of their learning requirements, both researchers emphasized the need to increase chances for nursing students to gain SRL skills such as metacognition and general self-efficacy in nursing education (Irvine et al., 2021; Pence & Suerth, 2020).

A small body of research suggests that supplementing traditional learning techniques with e-learning modules can help nursing students learn more (Gill et al., 2019; S. ...., 2019; T. ...., 2013; Voutilainen et al., 2017). When an ICT learning module is provided as a supplement to other instructional strategies, student satisfaction is also enhanced (Alvarez et al., 2017; Gaupp et al., 2018; Mettiäinen et al., 2014). The opportunity to supplement conventional learning with e-learning courses received excellent student responses (Miller et al., 2016; Renmarker & Carlson, 2019; Yangoz, 2017). The majority of studies indicated that e-learning was most effective in nursing education when used as a supplement to traditional face-to-face instruction by offering flexible, autonomous learning (Jarvill, 2021; Quesada-Pallarès et al., 2022; Youhasan et al., 2023).

E-learning supports SRL by shifting the emphasis from teacher-centered to student-centered learning and encouraging self-efficacy in individual learners (Youhasan et al., 2023).

## Method

The inclusion of a self-directed, self-paced e-learning module could give students a way to get ready for a medium-fidelity pediatric dehydration simulation scenario more effectively, according to a joint requirements analysis. For personal use, please get in touch with the primary author to gain access to the e-learning module.

## Result and Discussion

### 1. Phase I: Preparation

The intended audience for the e-learning module was junior nursing students. After completing the foundations course in the junior year's autumn semester, which covers the fundamentals of fluid tonicity, the juniors enroll in the pediatric course during the spring semester. After the pediatric course, the faculty conducted a needs analysis for learning. Students in this course study fluid tonicity and then put what they have learned to use in a medium-fidelity simulation scenario. Students must study a review of fluid tonicity from the previous semester, pediatric dehydration signs and symptoms, formulae for pediatric oral rehydration, fluid boluses, and fluid maintenance in order to be prepared for the simulation. Faculty asked students who had just finished the simulation for comments on the simulation preparatory tasks after all students had finished the simulation and final grades for the semester had been submitted.

According to student anecdotal responses to feedback requests, practice scenarios that permit active identification and distinction between the symptoms of mild, moderate, and severe dehydration in the pediatric population would have improved my understanding of pediatric dehydration and improved my performance in simulation and practice with immediate feedback from practice calculation problems that deal with the formulas for oral rehydration, fluid bolus, and fluid maintenance would have helped me to better prepare for the simulation by providing a review of critical formulas needed to provide quality patient care," the faculty content expert and faculty content consultant identified a need for additional preparation prior to the simulation experience. According to the educational needs study, including a self-guided, self-paced e-learning module might provide a path to better learning results.

**Table 1.** Project Team Roles

|                                  |  |
|----------------------------------|--|
| Librarian/instructional designer | The e-learning program was made using Articulate 360.<br>The overall layout of the e-learning module and its activities (how they are shown on the screen)<br>Animations<br>An animated film |
|----------------------------------|--|

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|                            |  |
|----------------------------|--|
| Faculty content expert     | periodic testing of the content application and feedback materials uploaded to a learning management system<br>Created an original thought<br>Analyzed the knowledge and necessity for education<br>All portions of the e-learning module's activities provide nursing-related information and knowledge.<br>Content organization using chosen learning strategies and methodologies<br>Determined procedures for measuring and assessment |
| Faculty content consultant | Periodically evaluated the information and offered comments<br>Aided in the analysis of knowledge and educational need<br>Content submitted by the content expert was examined<br>Analyzed to ensure that it adhered to learning theory and principles.<br>Periodically evaluated the information and offered comments.  |

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## 2. Project team's second phase

It was decided to form a cooperative, interdisciplinary project team. The project team's duties are listed in Table 1. A faculty content consultant, an instructional designer, a librarian, and a faculty content specialist made up the team. Based on the course syllabus, learning objectives were created and presented to the other team members for feedback. The module's learning objectives are listed in Table 2, and they will be evaluated yearly during the semester when the simulation takes place using a pre/post-test.

**Table 2.** Learning outcomes for pediatric fluid tonicity content

|   |  |
|---|--|
| 1 | Explain the differences between isotonic, hypotonic, and hypertonic solutions. |
| 2 | Recognize each kind of solution's effects on the body's homeostasis.           |
| 3 | Know the symptoms and indications of pediatric dehydration.                    |
| 4 | Determine the fluid bolus and maintenance rate for children.                   |
| 5 | Create a plan for pediatric care.  |

## 3. Phase 3: Creation of modules

After considering the learning objectives, the instructional designer selected the instructional development framework (Clark & Mayer, 2016). Clark and Mayer (2016) and Dick et al. (2009) served as the basis for the module (Behl et al., 2022; Tang et al., 2023). The development approach was labor-intensive and necessitated several iterative cycles of feedback and adjustments (Kowitlawakul et al., 2017).

The module was created as an asynchronous, independent, self-paced learning supplement to the conventional lecture. The module included assessment strategies. At the start of the module, learners might print a resource sheet to use while completing the task. The subject matter expert picked the measurement and assessment techniques and arranged the knowledge. Based on the comments they got, the content expert and consultant arranged the data. The content advisor assessed the data, examined the knowledge, offered suggestions, and ensured the project adhered to the framework and basic ideas of learning theory.

To get their opinions, two upcoming senior nursing students, a pediatric nurse, and a pediatric nurse practitioner, received a survey and access to the module. The faculty content expert could no longer grade any of the remaining clinical courses in the program because the two incoming seniors had satisfactorily finished the pediatric course. The working copy of the module itself was also made available for reviewers to comment on. Changes were made to the module's final version based on this feedback and the survey results. Table 3 provides a collection of survey findings.

**Table 3.** Shows survey inquiries and findings\*

| Questions   | Results |
|---|---------|
| I have enough knowledge from the instructions to use the module effectively.  | 5       |
| The learning goals were obvious.  | 5       |
| The subject was well structured.  | 5       |
| There were sufficient instances to make the points clear.   | 5       |
| There was not much-unrelated information on this topic.   | 5       |
| The pictures and animations improved my knowledge of the subject.   | 4.8     |
| I could read the information at my leisure.   | 5       |
| My grasp of the topic's essential points was put to the test by the knowledge checks.   | 5       |
| The subject matter was not too simple or complex.   | 4.8     |
| How well-versed in pediatric fluid tonicity were you before starting this module? One is entirely unfamiliar, but five is quite acquainted.   | 4.2     |
| What is the overall quality of this module on a scale of 1 to 10, with 10 being the highest quality?  | 10      |
| What did you think this module's most vital aspects were?   |         |
| "I think the knowledge checks were useful in determining whether you understood the material,"  |         |
| "The fluids' accompanying animations and descriptions in units 1 and 2 were handy. Additionally, the explanations that followed the knowledge tests were beneficial. Following the material are practice problems and questions."                     |         |
| "I liked how the various ideas were presented and the animations that showed them in action. I appreciate the quizzes since they let the students understand the content before moving on. What did you consider to be this module's weakest points?" |         |
| "The animations for hypertonic and hypotonic solutions were the only thing that seemed a little confusing (but that could just be me) because it did not seem to depict the change in interstitial space very well."                                  |         |
| "The wordings and explanations were neither present nor confusing throughout the patient examples."   |         |
| "I did not fully comprehend the intravascular, interstitial, etc. animations."  |         |
| "none"  |         |
| If you have any other comments, do let us know.   |         |
| "I adore this module and look forward to what the next generation can learn from it. " Great work!!!"   |         |
| "Excellent module"  |         |
| "Very detailed and organized!"  |         |

\* Results of the survey, using a Likert scale of 1 to 5, with five representing strongly agree,

Based on 4/5 responses, one responder skipped this question.

Additionally, the content validity of each module unit and the module as a whole was investigated to measure every aspect of the construct of pediatric fluid tonicity. Three nurse educators professionals evaluated the content validity: the faculty content consultant, a pediatric

nurse, and a pediatric nurse practitioner. To establish whether the module as a whole appropriately examined all elements of the concept of pediatric fluid tonicity, the computation of a content validity index (CVI) on the relevance and appropriateness of each unit was completed (Gadsboell & Tibaek, 2017; Moxham & Patterson, 2017; Polit et al., 2007; Polit & Beck, 2006).

Each item's relevance was evaluated on a four-point Likert scale, with one denoting "not relevant," 2 "somewhat relevant," 3 "quite relevant," and four denoting "highly relevant." Based on the evaluations for each item and divided by 3 (the number of experts), the item CVI (I-CVI) was calculated. The average of the I CVIs yielded a scale CVI value of 1.0. Excellent content validity is indicated by a value of 0.90 or higher (Polit et al., 2007), (Lowe, 2019). As a result, the module's content validity was judged to be strongly supported.

## Conclusion

Self-regulated e-learning modules are a cutting-edge pedagogical approach that can help students perform better and get better results. Learners' usage of SRL has a favorable correlation with academic achievement. In order to encourage deep learning, nurse educators should give students experiences that will help them build self-regulated behaviors, including self-efficacy and metacognitive techniques. These hands-on activities increase student engagement and enable learners to digest more complicated knowledge. Students' self-efficacy, self-reflection, willingness to study, and adoption of lifetime learning techniques may all be improved by incorporating an e-learning module into traditional learning methods, creating a secure learning environment. Please get in touch with the principal author to get access to the e-learning module for personal use.

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