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Student Perceptions of the Athletic Therapy Interactive Concussion Educational (AT-ICE) Tool

Perceptions des personnes étudiantes sur l'outil éducatif interactif sur les commotions cérébrales en thérapie sportive (AT-ICE)

Colin D. King, *Acadia University, Canada*
Loriann M. Hynes, *York University, Canada*

Abstract

Previous research has identified a considerable amount of variability in how healthcare professionals are taught to recognize, assess, and manage concussions. Responding to these findings, an innovative applied learning technology tool, the Athletic Therapy Interactive Concussion Educational (AT-ICE) Tool, was developed to help teach athletic therapy students how to recognize, assess, and manage concussions. The purpose of this research was to employ an interpretivist conceptual framework to explore athletic therapy students' perceptions of this tool. A questionnaire was used to identify individual factors that impacted student perceptions of AT-ICE and how it could be integrated into the classroom. Overall, participants enjoyed using AT-ICE and felt it helped to stimulate their critical thinking about the entire continuum of concussion care. Several important themes emerged including the importance of detailed scenarios, sharing lived experiences, and integrating anatomy within assessment and management scenarios. Findings suggest that AT-ICE was an effective educational technology that stimulated critical thought throughout the entire continuum of concussion care. Future research could continue to investigate the effectiveness of the tool or explore different ways to implement it in formal athletic therapy educational settings.

Keywords: applied learning technology, athletic therapy education, concussion care

Résumé

Des recherches antérieures ont identifié une variabilité considérable dans la manière dont les personnes professionnelles de la santé apprennent à reconnaître, évaluer et gérer les commotions cérébrales. En réponse à ces résultats, nous avons développé un outil techno pédagogique d'apprentissage appliqué novateur, l'outil éducatif interactif sur les commotions cérébrales en thérapie

sportive (AT-ICE), pour aider à enseigner aux personnes étudiantes en thérapie sportive comment reconnaître, évaluer et gérer les commotions cérébrales. Le but de cette recherche était d'utiliser un cadre conceptuel interprétatif pour explorer les perceptions des personnes étudiantes en thérapie sportive à l'égard de cet outil. Un questionnaire a été utilisé pour identifier les facteurs individuels qui ont eu un impact sur les perceptions des personnes étudiantes à l'égard de l'outil AT-ICE et sur la manière dont il pourrait être intégré dans le cours. Dans l'ensemble, les personnes participantes ont apprécié l'utilisation de l'outil AT-ICE et ont estimé qu'il les aidait à stimuler leur réflexion critique sur l'ensemble du continuum des soins des commotions cérébrales. Plusieurs thèmes importants ont également émergé, notamment l'importance de scénarios détaillés, du partage d'expériences vécues et de l'intégration de l'anatomie dans les scénarios d'évaluation et de gestion. Les résultats suggèrent que l'outil AT-ICE était une technologie éducative efficace qui stimulait la pensée critique tout au long du continuum des soins des commotions cérébrales. Les recherches futures pourraient continuer d'étudier l'efficacité de l'outil tout en explorant différentes façons de le mettre en œuvre dans des contextes éducatifs formels de thérapie sportive.

Mots-clés : éducation en thérapie sportive, soins des commotions cérébrales, technologie d'apprentissage appliqué

Introduction

Concussions have the potential to become a burden for the public health care system when not immediately recognized (Damji & Babul, 2018). Previous research has identified a considerable amount of variability within healthcare professional education regarding the recognition, assessment, and management of concussions (Haider et al., 2018; Mann et al., 2017; Yorke et al., 2016), which has the potential to contribute to challenges in consistently identifying such injuries. Youth and adolescent concussions reported to hospital emergency departments saw a four-fold increase over the 11-year period of 2003–2013 (Zemek et al., 2017) with sport participation being the most common mechanism of injury (Iverson et al., 2023; Zemek at al., 2017). Certified athletic therapists/trainers (ATs) are unique in that they are typically one of the only health care providers managing concussions from initial injury identification through full recovery. In many sporting environments, ATs are the first responders on site to recognize and identify athletes with suspected concussions (Broglio et al., 2014). With a growing need to recognize potential concussions early and prevent long term sequalae (D. King et al., 2014), it is critical for ATs to have training and a comprehensive background in concussion recognition, assessment, and management.

The Sport Concussion Assessment Tool™ 6 (SCAT6) recognizes ATs as members of the sport-related concussion network with expertise in diagnostic assessments, clinical evaluations, and treatment interventions for sport-related concussions (Echemendia et al., 2023). While many ATs have used the evolving SCAT tools since the first International Conference on Concussion in Sport in 2001, a study by Lempke et al. (2020) showed that 40.1% of AT participants were not familiar with the SCAT5. SCAT5 was the most current protocol at the time of their publication, as recommended by the consensus statement on concussion in sport (McCrory et al., 2017). The Lempke et al. (2020) finding may be

because there was and continues to be no defined minimum standard for concussion recognition, assessment, and management within the AT profession. Despite the unique healthcare training of ATs, variability exists in the educational approaches to concussions (Lempke et al., 2020).

In addition to the availability of concussion assessment tools and consensus statements related to concussion management and best-practice guidelines, there is a need for educators of aspiring ATs to provide more consistent training and greater opportunities for learning the entire continuum of concussion care, being recognition, assessment, and management. While variability exists within each accredited institution for teaching AT in Canada, current concussion education about the recognition, assessment, and management of concussions is delivered through didactic theory in the traditional classroom setting, skill practice during guided laboratory settings, and experientially through various placements with teams and in clinical settings throughout students' respective programs (C. D. King & Hynes, 2021). However, due to the nature of student placements in most healthcare professions, each student is not guaranteed to follow concussions across the entire continuum from point of injury to return to sport. While theoretical and practical education are valuable, they do not guarantee that students will obtain the confidence to manage concussions upon graduation (Yorke et al., 2016). Hunt et al. (2017) discovered unique perspectives from students about effective concussion education and concluded that AT educators should explore different educational techniques that encourage higher-level thinking and implementation, instead of focusing on traditional didactic education. Simulation education is one method that can help foster higher order thinking with physical skill response and has been shown to improve the learners' confidence in the absence of lived experience in student placements (Miller et al., 2018). Unfortunately, this method of learning and skill development is not always accessible to students across all academic institutions due to the cost and space availability to house such equipment.

To provide the most optimal educational experience that imparts strong foundational knowledge coupled with confidence in the execution of practical skills, educators are encouraged to reflect on the scope of practice of their respective profession, the unique characteristics of their educational context, and effective pedagogical strategies for improving the ways that health professionals learn about recognizing, assessing, and managing concussions. In response to this need, we have developed the Athletic Therapy Interactive Concussion Educational (AT-ICE) Tool, an online applied learning technology designed to engage students in realistic and interactive concussion scenarios to help to bridge the gap between classroom activities and real-world situations.

Method

Conceptual Theoretical Framework

The purpose of this project was to explore student perceptions of the learning technology tool called AT-ICE. The decision was made to employ an interpretivist conceptual framework to guide the design of this study instead of exploring the tool's effectiveness solely through a statistical positivist lens (Ashley & Orenstein, 2005). Following this interpretivist epistemology allowed us to explore some of the individual factors that impacted students' perceptions of AT-ICE and how it could be integrated

into the classroom, an important aspect to consider when designing educational interventions (Dean, 2018). Generalizability of findings is not a tenet of interpretivist inquiry (Stenfors-Hayes et al., 2013). Readers can compare their unique educational contexts to those described in this study, before determining if this or a similar tool would be beneficial to use within their specific context.

Participants

University research ethics approval was granted by each of the Canadian Athletic Therapists Association (CATA) accredited institutions prior to data collection. There were nine CATA institutions at the time of the study. Recruitment emails were sent through the program directors to the graduating student cohorts from each institution. A total of 35 students responded, although 13 responses were removed from the sample due to being incomplete. Complete responses were provided by 22 participants (20.7±1.2 years; 14 females, 8 males), representing five CATA accredited institutions.

Instrumentation

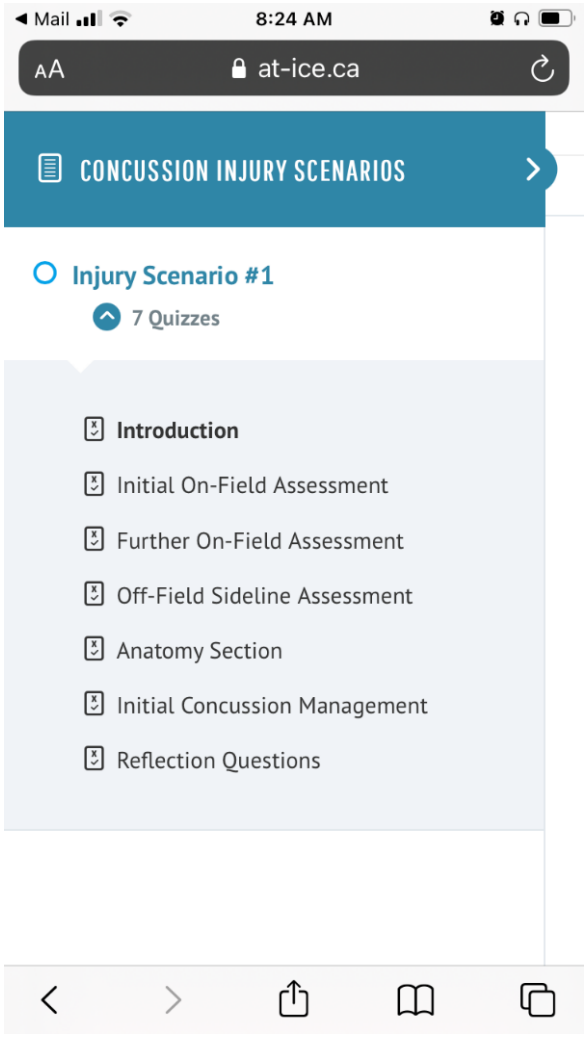
Athletic Therapy Interactive Concussion Educational Tool

Prior to completing the questionnaire, participants were first asked to independently review AT-ICE. It is an online learning technology tool designed to engage students in realistic, contextually authentic concussion scenarios by integrating the knowledge and practical skills required to effectively recognize, assess, and manage concussions (C. D. King & Hynes, 2022). The AT-ICE guides students through complete situational experiences covering the entire continuum of concussion care, starting with on-field recognition of a potential injury, all the way through the concussion management process. During the development process, AT experts were engaged to help define the minimum standard/level of competence that should be expected of entry-level ATs (C. D. King & Hynes, 2022). Various technologies and pedagogical strategies were incorporated into each component of the online tool to engage students in the various types of knowledge, skills, and reflection required for effective concussion care.

Figure 1 shows AT-ICE Injury Scenario #1 as an exemplar of the template used for each concussion scenario within AT-ICE. The template consists of: 1) an introductory section that sets up the initial scenario; 2) the initial on-field assessment; 3) further on-field assessment; 4) off-field sideline assessment; 5) anatomy section; 6) initial concussion management; and 7) reflection questions section. To organize the different types of questions, each section in the template was further divided into three subsections, incorporating different pedagogical strategies, activities, and technologies.

Figure 1

AT-ICE Injury Scenario #1

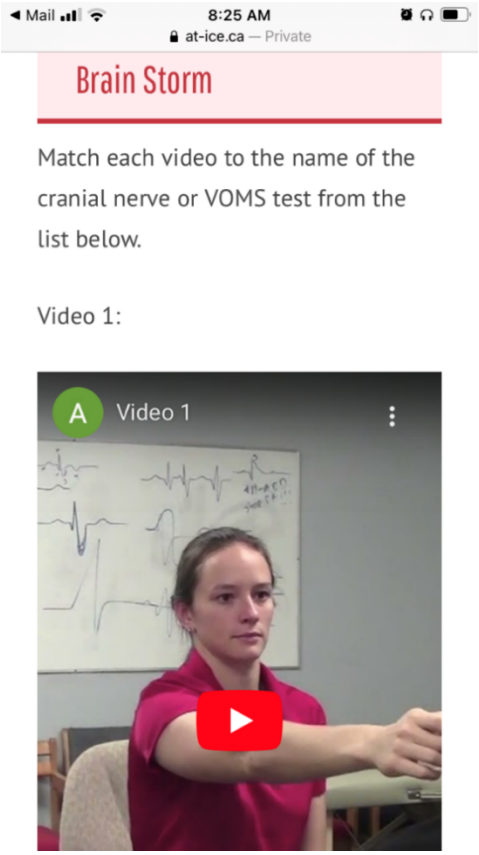


The first subsection labeled *Brain Storm* (Figure 2) included content knowledge questions using multiple-choice, matching, and open-ended questions, which provided further critical thinking opportunities for students. The second subsection, *Brain Share*, involved structured peer activities that engaged students in essential physical assessment psychomotor skills required to demonstrate competence in concussion care. This subsection encouraged the use of technology by asking students to video themselves performing specific concussion tests and uploading them with their submission. By videoing their skills, each student could critically reflect on their performance, retake the video until it met their satisfaction, and then they could upload a final version to be evaluated by their instructor. Brain Share activities helped to structure peer-assisted learning by prompting students to discuss with a partner their experiences about a particular situation (such as "With a partner, discuss how you would rule out each of the injuries included in the answer above"). The final subsection, *Brain Tease*, included critical thinking questions that asked students to think about how they would respond to a particular

situation (such as, “You are completing your on-field assessment and a referee comes over asking you to hurry up and get the athlete off the field. How would you handle this situation?”).

Figure 2

Brain Storm Section Example



Questionnaire

A custom questionnaire was designed using the Acadia University Online Survey system, to explore student perceptions about using technology for learning, and about using AT-ICE (Appendix). The questionnaire statements about using technology for learning were important to gauge participants’ initial predisposition to technology, because, as Hart and Sutcliffe (2019) wrote, if students were intimidated by, or had initial negative attitudes towards using technology for learning, then those perceptions could impact the overall findings of the study. The questionnaire also included open-ended questions asking students to reflect on improvements for the tool and potential ways to implement such a tool within formal academic settings. The questionnaire was initially field-tested with two teachers from CATA accredited programs, and with two AT students who were not eligible to participate in the study, because they were not in the graduating year of their program. During this review process, the questionnaire was reorganized and grammar was corrected.

Procedure

A recruitment email was sent to all program directors of the nine CATA accredited institutions (Acadia University, Camosun College, Concordia University, Mount Royal University, Sheridan College, Université du Québec à Trois-Rivières, University of Manitoba, University of Winnipeg, and York University) and asked to be distributed to the graduating student cohorts from each institution. The recruitment email included the links for the consent form, AT-ICE (www.at-ice.ca), and the online questionnaire. After providing consent, participants were instructed to review AT-ICE first, before responding to the online questionnaire. Program directors were sent a reminder email two weeks after the initial communication. It was explained to all students that participation was voluntary and not a mandated part of their academic program. Additionally, program directors were not provided information as to who decided to participate in the research project.

Data Analysis and Trustworthiness

As seen in Appendix, the questionnaire asked participants to report their level of agreement with 16 statements by selecting a single response on a 5-point Likert scale ranging from 1 = *strongly disagree* with the statement to 5 = *strongly agree* with the statement. Since there were 22 completed questionnaires, each descriptive statistic reported in Table 1 has an N-value of 22. These responses were aggregated, and descriptive statistics (means ± standard deviations) were calculated in Microsoft Excel®. The three open-ended responses were analyzed for emergent themes by the two researchers. After separate analyses were conducted, the researchers met to discuss any themes until consensus was reached.

Results

Descriptive Statistical Analysis

Table 1

Responses to Questionnaire Statements 5 to 20

Questionnaire Statement	*M*	*SD*
5. I enjoyed using this educational tool	4.67	0.49
6. I feel that technology, when used the right way, can empower student learning	4.67	0.49
7. The educational tool came with clear instructions about how to follow the scenarios	4.40	0.51
8. The concussion scenarios were presented in an understandable format	4.73	0.46
9. The concussion scenarios were easy to navigate	4.27	0.88
10. The concussion scenarios helped to stimulate student critical thinking	4.80	0.41
11. I have used text-based cases while studying before	4.67	0.62

Questionnaire Statement	*M*	*SD*
12. The anatomy animation clips were difficult to use	3.20	1.26
13. The detail of the anatomy animations allowed me to accurately give additional context to the scenarios	2.07	0.96
14. The anatomy animations were an adequate substitute for hands-on anatomy models	4.47	0.52
15. The concussion scenarios did not provide enough information to carry out an accurate assessment	2.13	1.16
16. The concussion scenarios did not provide enough information to make a decision regarding the most appropriate management plan	2.07	0.96
17. The concussion scenarios were too difficult for my current knowledge base	2.13	0.83
18. I think that using technology to present scenarios is more motivational than using text-based cases	4.27	0.70
19. The level of analysis required in the scenarios was too difficult	2.00	0.76
20. Using technology to learn is distracting	1.80	0.77

Using Technology for Learning

When exploring the impact of any form of educational technology, it is important to consider participants' initial predispositions to technology use. This is important because if an individual has negative attitudes about using technology for education, then these negative attitudes may be reflected in their responses to any form of educational technology, regardless of differences in design (Asscher & Glikson, 2023). Negative predispositions towards technology would make it difficult to interpret if negative responses were about a specific educational technology or general negative attitudes about technology use (Hart & Stufcliffe, 2019).

The findings from this study suggest that the participants enjoyed using technology for their learning and were not intimidated by its use. Participants reported a strong level of agreement with the questionnaire statement: I feel that technology, when used the right way, can empower student learning (4.67±0.49). Additionally, participants disagreed with the statement: using technology to learn is distracting (1.80±0.77). Based on these findings, there were no initial negative predispositions to using technology found in the sample.

General Perception of AT-ICE

Overall, the participants felt that AT-ICE was easy to use and was more motivational to their learning than using text-based cases (4.27±0.70). This finding was further supported by the participants agreeing with the following questionnaire statements: the educational tool came with clear instructions about how to follow the scenario (4.40±0.51), the concussion scenarios were presented in an

understandable format (4.73±0.46), and the concussion scenarios were easy to navigate (4.27±0.88). A more neutral response (3.20±1.26) emerged for the statement: the anatomy animation clips were difficult to use. This finding made sense since the anatomy animations were not embedded directly into the tool, as students were provided with a specific list of YouTube links to watch anatomy animations from different content areas (e.g., cranial nerves and vascular anatomy).

Perception of Impact of AT-ICE on Learning

The main purpose of this project was to explore the students' perception of impact of AT-ICE on learning. Participants appeared to enjoy using AT-ICE, strongly agreeing with statement number 5 from the questionnaire (4.67±0.49). Participants felt that the tool helped to simulate their critical thinking (4.80±0.41), while helping them to learn and guide the practice of skills required to carry out appropriate concussion recognition, assessment, and management plan selection. To ensure that participants were reading statements and not selecting all the same responses on the Likert scale, ten of the statements were written in the affirmative and six in the negative. The negative statements were numbered 12, 15, 16, 17, 19, and 20. Participants disagreed with the following negative questionnaire statements: the concussion scenarios did not provide enough information to carry out an accurate assessment (2.13±1.16), the concussion scenarios did not provide enough information to make a decision regarding the most appropriate management plan (2.07±0.96), and the level of analysis required in the scenarios was too difficult (2.00±0.76).

Thematic Analysis of Open-Ended Questions

Within the open-ended questions, participants were asked to reflect and explore the individual factors that impacted their perceptions of AT-ICE. When asked to describe the areas that they enjoyed most about AT-ICE, several themes emerged from the participant responses: the importance of detailed scenarios, sharing lived experiences, and integrating anatomy within assessment and management scenarios.

Detailed Scenarios

The first theme was described as the importance of having organized scenarios with sufficient details to be able to have a better appreciation for what is being asked. Fifteen participants described the importance of having structured scenarios that included real-time videos to demonstrate the mechanisms of injury. These participants commented that oftentimes during simulated practical scenarios, they needed to make assumptions about what actually happened to the athlete based on using only a written text description. The mechanism of injury videos in AT-ICE scenarios ensured that all students were evaluating the exact same situation and able to observe what happened, how the athlete responded to the injury, what the therapist saw when they arrived on scene, etc. As one participant described:

> I liked how there were real sport videos to analyze instead of reading a block of text. I think it's better to practice watching videos because it helps me practice looking for differential diagnoses while watching the injury happening in real time. (AT-Stu 2)

Sharing Lived Experiences

Another theme that emerged was related to participants' personal experiences during structured peer activities within the Brain Share sections. Twelve participants provided comments about the importance of embedding these types of questions into educational tools so that the students have the opportunity to learn from one another. This was illustrated by one participant who said:

> Asking for our personal experiences is important because we may have specific examples that can help each other. Maybe I saw more incidents in my sport (rugby) and can help others with what I saw, how the athlete appeared, what they complained about, etc. We all don't get to see the same number of concussions in our placements and if we do, they are not always the same. (AT-Stu 12)

Integrating Anatomy Within Assessment and Management Scenarios

The third theme that emerged was related to the integration of anatomy knowledge into the assessment and management scenario. Seven participants provided commentary about the anatomy sections and thought it was an important area that is often forgotten about in these types of educational tools. As one participant described:

> Usually when we work through case scenarios in class, we are not asked much about the anatomy. We often just focus on the assessment piece or the rehab piece and not really get back in-depth to the anatomy we covered. I liked how the tool had all aspects of it. The assessment, the anatomy, and the management. (AT-Stu 3)

Another participant added:

> I had confidence that the anatomy videos provided were accepted by an academic institute and can be trusted- there are so many YouTube videos for anatomy and assessment skills that it is difficult to know if you are getting the right information on your own. (AT-Stu 7)

Improvements for AT-ICE

Participants were asked to suggest any improvements to AT-ICE. Most of the feedback provided was related to the technical functions of the tool itself. For example, seven participants described the desire to have the ability to edit their responses before submitting the final version, and five participants suggested having correct answers show up after the final submission with explanations and rationale for the correct responses. The only other theme that emerged from this question was to have more scenarios built within the tool with differing levels of complexity for each scenario. As one participant said, "More scenarios would be useful so we can practice the easier straight forward ones but also to challenge ourselves with something more complex that we often see in concussion cases" (AT-Stu 21). Another participant added, "The management piece was pretty easy. I would suggest adding more complicated scenarios that have us making decisions based on what symptoms someone reports. That would be very useful and interesting to work through" (AT-Stu 14).

Implementing AT-ICE Within Teaching and Learning

The final question on the questionnaire asked participants to describe how they could use AT-ICE as part of their learning about concussion care. Originally, AT-ICE was designed to be used as a supplementary tool for AT educators, and not as a standalone tool that replaces in-person learning about concussions (C. D. King & Hynes, 2022). Participant responses overwhelmingly supported the notion of using this tool as a supplement to help guide their learning about concussion care. Within the responses, 10 participants described a form of flipped classroom (Akçayır & Akçayır, 2018), without actually using the specific term. As one participant suggested:

> This would be useful to educators as a small homework assignment to do before the on-hands lab time. The students do one section, such as on-field management, before coming to class and the instructor then goes through the entire section with them to demonstrate the new skills and provide corrections and answer questions. This way, the students can apply their skills to each new case in a self-directed way with guidelines to keep them on task, and the instructor does not simply give the answers away. (AT-Stu 12)

Similarly, another participant replied:

> Our professors have so much to add to this topic that we don't get in a textbook. They can provide us with their real-world experiences as to what to expect. How difficult it is to actually assess concussions a lot of the time. To share with us what they saw, what they experienced because as we know, not every concussion injury follows the textbook case. (AT-Stu 1)

Seven participants felt that AT-ICE could be used by their teacher to guide their learning in a classroom setting, by completing sections individually and then taking part in a wider class discussion. According to AT-Stu 10, AT-ICE "could be presented to complete individually/in pairs and then open a classroom discussion afterwards in which students can ask questions/share stories to facilitate a more in-depth learning experience from peers and professors."

Discussion

Proposed Teaching Plan for AT-ICE

When implementing any form of educational technology into the classroom, educators need to think about how to use that particular technology in pedagogically meaningful ways (Mishra & Koehler, 2006). By following this approach, research has shown that educators can improve their delivery of instruction by using diverse pedagogical strategies to provide more valuable learning experiences (Fawns, 2022; Rapanta et al., 2021). As described by participants in the current study, we propose that AT educators consider using the flipped classroom model when using AT-ICE.

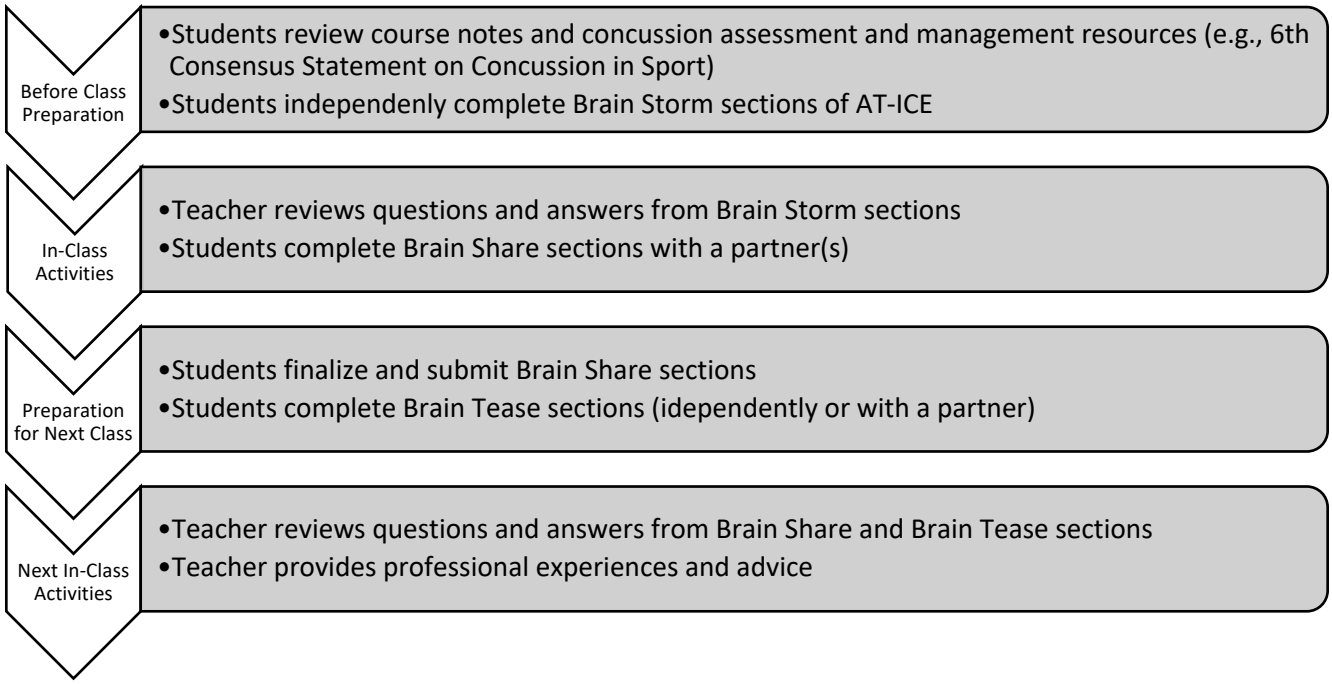
The flipped classroom model has long been recognized as an innovative and effective instructional approach in higher education, especially when integrating educational technologies (Baytiyeh, 2017; Hwang et al., 2015; Lo, 2018). This instructional approach allows for more in-class time being spent on interactive learning activities, as the traditional content delivery component (e.g.,

lecturing) is shifted outside of the classroom through instructional videos and directed readings (Lo, 2018). However, effective use of this method requires purposeful in-class learning designs and activities that help connect student learning across at-home and in-school contexts (Hwang et al., 2015).

Study participants described examples of how their teachers could use AT-ICE in pedagogically meaningful ways, by guiding students to actively think and discuss the different aspects of concussion care as they work through the various sections of the tool. Figure 3 provides a proposed teaching plan of how an AT educator could use the flipped classroom model to structure their use of AT-ICE. Additionally, educators could allow for time to provide professional feedback, share their experiences, and provide advice of what they would do in a similar situation (Hwang et al., 2015). In these types of interactions, the student plays the role of the active learner, whereas the teacher plays the role of the facilitator as opposed to the traditional lecturer or instructor (Baytiyeh, 2017).

Figure 3

Proposed Teaching Plan for AT-ICE



Additional pedagogical approaches could be beneficial when implementing AT-ICE, as we are not advocating for a rigid teaching model that must be adapted by all educators in the exact same manner. Effective learning technology integration does not advocate for or against a particular technology or pedagogy because what has been shown to be effective and innovative today can quickly become outdated (Kopcha et al., 2020). Instead, we are advocating for educators to take a critical stance when deciding to use an educational tool like AT-ICE, and with the position of Väätäjä and Ruokamo (2021), to think about how a tool can be implemented in pedagogically meaningful ways within a unique educational context.

Limitations

Two limitations within this study were noted. One limitation was related to the academic level of students who volunteered for this study. Since we did not ask about grade point averages, we do not know the academic level of students who responded. Acknowledging that the participants self-selected, it is possible that the sample may be composed of predominantly academically strong students, because top students often like to be challenged and may prefer these learner-centred, self-directed approaches whereas other students may share different opinions. Future research could consider these potential differences and explore whether these tools are beneficial to an academically wide range of students, not just those who are engaged, motivated, and active learners. Another limitation was that we were successful in recruiting participants from only five of the nine CATA accredited institutions, meaning our sample is not representational of all nine accredited institutions.

Future Research Directions

The findings described herein highlight the potential for the online applied learning technology tool AT-ICE to enhance concussion care education for AT students. Future research could explore both student and teacher perspectives of these types of innovative educational tools. Formal pre and post learning assessments could be completed to explore the effectiveness of the tool. Future studies could explore the impact of AT-ICE on student self-efficacy and confidence in their abilities to recognize, assess, and manage concussions. Additionally, a follow-up study could investigate AT teachers' perceptions of AT-ICE, the proposed teaching plan, and other ways that these types of applied learning technologies can be integrated in pedagogically meaningful ways within AT classrooms.

Conclusion

The findings from this study demonstrated that AT-ICE was perceived positively by AT student participants as a learning technology tool that can be used to teach AT students about all aspects of concussion care. The tool was designed to stimulate student critical thinking, provide structured independent critical reflection opportunities, and guide peer-assisted learning to practice the skills required to carry out comprehensive concussion recognition, assessment, and management plans. Feedback from the participants was used to design a flipped classroom teaching plan that could be used by Athletic Therapy educators to implement the Athletic Therapy Interactive Concussion Educational tool in a pedagogically meaningful way.

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Appendix

Student Questionnaire

The following questionnaire has been designed in an effort to collect valuable feedback while exploring the effectiveness of using the Athletic Therapy Interactive Concussion Educational Tool in athletic therapy accredited institutions.

Thank you for your participation.

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1. Gender
    a. Female
    b. Male
    c. Other _____
    d. Wish Not to Disclose
2. Age
3. Year in Athletic Therapy Program _____
4. Accredited Institution
    a. Sheridan College
    b. York University
    c. Concordia University
    d. University of Winnipeg
    e. University of Manitoba
    f. Mount Royal University
    g. Camosun College
    h. UQTR
    i. Acadia University

After reviewing the **Athletic Therapy Interactive Concussion Educational Tool,** please answer the following questions by placing an "x" by a single number on the Likert Scale that best represents your answers. Answers will be scored on a scale with a value of 1 assigned to strongly disagree, all the way to 5 for strongly agree.

5. I enjoyed using this educational tool.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

6. I feel that technology, when used the right way, can empower student learning.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

7. The educational tool came with clear instructions about how to follow the scenario.

   ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

8. The concussion scenarios were presented in an understandable format.

   ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

9. The concussion scenarios were easy to navigate.

   ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree 5

10. The concussion scenarios helped to stimulate student critical thinking.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

11. I have used text-based cases while studying before.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

12. The anatomy animation clips were difficult to use.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

13. The detail of the anatomy animations allowed me to accurately give additional context to the scenarios.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

14. The anatomy animations were an adequate substitute for hands-on anatomy models.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

15. The concussion scenarios did not provide enough information to carry out an accurate assessment.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

16. The concussion scenarios did not provide enough information to make a decision regarding the most appropriate management plan.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

17. The concussion scenarios were too difficult for my current knowledge base.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

18. I think that using technology to present scenarios is more motivational than using text-based cases.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

19. The level of analysis required in the scenarios was too difficult.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

20. Using technology to learn is distracting.

    ( ) 1 Strongly Disagree ( ) 2 Disagree ( ) 3 Neutral ( ) 4 Agree Strongly ( ) 5 Agree

21. What were two things that you enjoyed the most about the AT-ICE?
22. What are some improvements that you would suggest for the AT-ICE?
23. Describe how you could use the AT-ICE as a part of your learning about concussion care.

Authors

Colin D. King, PhD, CAT(C), is a Professor and Athletic Therapist in the School of Kinesiology at Acadia University in Nova Scotia, Canada. He also sits on the Board of Directors for the World Federation of Athletic Training and Therapy and acts as the Program Director of the CATA accredited athletic therapy program at Acadia. *Email:* colin.king@acadiau.ca

Loriann M. Hynes, PhD, CAT(C), is an Associate Professor and Athletic Therapist in the School of Kinesiology & Health Science at York University in Ontario, Canada. She is also the Program Director of the CATA accredited Athletic Therapy Certificate at York. *Email*: lhynes@yorku.ca