

Making learning fun to increase nursing students' success: Formative feedback in communication learning

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RESEARCH

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ABSTRACT

Background

Communication skills are taught in most Bachelor of Nursing programs; however, student performance is often not monitored or tested until the final exam. Audience Response System (ARS) technology enables the collection of feedback from students during lectures to improve their quality of learning.

Aims

We assessed the efficacy of ARS technology in promoting the understanding of communication skills among nursing students.

Methods

Questions were integrated into 14 lectures using the ARS platform Learning Catalytics (LC; Pearson UK, London, UK). Students answered the questions using their own web-enabled mobile devices. One hundred and twenty second-year nursing students participated in this study. Their answers were pooled and prompt formative feedback was provided in the classroom. A questionnaire was distributed

to evaluate their perceptions of ARS use.

Results

All students reported that they enjoyed ARS use: 92 per cent stated that it helped to identify their learning needs and 87 per cent agreed that it promoted the integration of key concepts. The most common theme within the feedback was that of identifying their own learning needs. Repeated questioning produced a significant increase ($p<0.05$) in students' knowledge of specific concepts.

Conclusion

The use of ARS technology to provide prompt feedback promoted teaching and learning among undergraduate nursing students. ARS use enabled the identification of individual learning needs and aided revision before summative exams. It also improved students' confidence and understanding of key concepts. Moreover, students of different educational levels and learning styles were identified, tracked and given support through the use of ARS technology.

Key Words

Audience response systems, feedback, higher education, formative assessment, nursing, e-learning

What this study adds:

1. What is known about this subject?

Audience Response System (ARS) technology enables the collection of formative feedback from students during lectures with the aim of improving their quality of learning.

2. What new information is offered in this study?

ARS use enabled the identification of individual learning needs, aided revision before summative exams and improved nursing students' confidence and understanding of key concepts. Ultimately students found ARS fun and it promoted engagement within lectures.

3. What are the implications for research, policy, or practice?

ARS technology can equip nursing students with knowledge and skills and promote professional and confident nurses in the future, consequently improving the quality of patient care and safety.

Background

Delivery of the highest quality of care and patient safety is the primary goal of health-care organizations worldwide. However, the increasing demands and pressure on health-care settings puts' the quality of patient care and safety at risk.¹

According to the literature, nurses who build effective communication relationships tend to make fewer medical errors, thus increasing the quality of patient care and safety.² Therefore, it is the responsibility of medical educators to ensure that undergraduate nurses are equipped with effective communication skills before they start their professional careers.

Communication skills are among the core subjects taught in most Bachelor of Nursing programs.³ Communication skills courses are a vital part of undergraduate nursing programs because they prepare future nurses to be effective communicators when dealing with patients, nurses and other allied health professionals.³ The purpose for this course is to introduce nursing students to the essentials of effective communication with clients, families, and other health care professionals. The main learning outcomes is to determine elements of professional communication and to recognize differences between a social and professional relations. Therefore, the consequences of inadequate communication on safe and efficient practice are profound and are recognized by both patients and allied health professionals.^{2,4} Lack of communication will lead to increase medical errors and affect the overall quality of care.¹ Communication skills courses must therefore be designed to encourage undergraduate nurses not only to recall and memorize the facts necessary to pass the exam, but also to apply this knowledge in any clinical environment.⁴ To this end, students should be the focus of the learning process.^{5,6} One way to achieve student-focused learning is to get students actively engaged in classrooms.^{7,8} Medical educators are always looking for new approaches for teaching to ensure that learning is achieved.⁶ One way to achieve this is by applying student-centred interactive teaching. The fundamental role of student-centred learning is to actively engage students in the classroom. This way of teaching enables medical educators to assess students'

progress, satisfaction and understanding to ensure that learning is achieved.⁹ However, many tutors report that students' performance is often not monitored or tested until the final summative exam.¹⁰ Moreover, students state that a lack of formative feedback affects the teaching and learning process.

Audience Response System (ARS) technology enables the immediate collection of feedback from large numbers of students during lectures. This formative assessment has the potential to improve students' quality of learning.^{8,10} The Learning Catalytics platform (LC; Pearson UK, London, UK) is an interactive ARS that encourages participation in interactive tasks and active learning via students' own smartphones, hand-held devices and laptops.¹¹ Educators use the LC platform to present a collection of open-ended questions that require analytical and critical thinking while observing their responses in real time to determine areas in which they are struggling.¹¹ Based on this information, educators can adapt their instructional strategy while delivering the class. Therefore, the LC platform can be used to assess and support understanding and any issues can be dealt with immediately. Students make their choices interactively and anonymously. The use of ARS technology in this way benefits both the teaching faculty and students.¹⁰ Although students are not identified at the point of completing their answers, ARS technology allows educators to identify and review each student's answers and track struggling students. This gives educators a powerful advantage, enabling intervention and support at an early stage of study.^{9,10}

ARS technology is used to promote active learning within the classroom in numerous disciplines.⁸ Researchers have identified that ARS use in combination with question-driven instruction make classroom teaching more student-centred, creating an environment for active learning.⁸ However, few studies have examined how ARS technology engages and empowers students in teaching and learning, particularly among nursing students.¹² Moreover, no studies have been conducted on the ability of ARS technology to promote teaching and learning in medical and health-sciences programs, including nursing, in the Arab region.¹² Therefore, in this study, we evaluated the efficacy of ARS technology in promoting the understanding of communication skills among nursing students. Our findings will enrich current knowledge on the effects of summative assessment and formative feedback on teaching and learning. The purpose of this research is to assess the efficacy of ARS technology in promoting the understanding of communication skills among nursing students.

Method

Participants

A complete cohort of second-year nursing students attending a communication skills course at Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia, between September 2017 and December 2017 ($n=120$) were included in this study. Institutional review board approval was sought from the College of Nursing before commencing this study. Consent forms were signed before the start of data collection. All data were kept confidential and anonymous before publication.

Setting

Lecture questions in the audience response system

The LC platform was the ARS technology used in this study. Questions were embedded in 14 lectures, comprising two hours of the communication skills course. The questions tested Bloom's taxonomy knowledge, comprehension and application domains and were based on the learning outcomes of each lecture. The questions were in multiple choice and true or false formats. Pre- and post-lecture questions were delivered to students. The pre-lecture questions tested learning outcomes covered in previous lectures, whereas the post-lecture questions tested undergraduate nurses' understanding of concepts covered in that specific lecture.

The students were given 30–45 seconds to answer each question. A timer was displayed on the PowerPoint® (Microsoft Corp., Redmond, WA, USA) presentation screen. As soon as all students had answered a question, the correct answers and a graph outlining the students' responses were displayed on the PowerPoint® presentation screen.

Formative feedback on the Learning Catalytics platform

The LC platform was used as an ARS technology.¹¹ Educators can assess students' responses in real time. At the start of the class, students were provided by their instructors with a session ID, a unique access code required to login to the LC platform (<https://learningcatalytics.com>).¹¹ This code maintained each student's anonymity when displaying their answers. The number of students who answered the question appeared in a graph and the correct answer was indicated on the screen (Figure 1).

Undergraduate nurses' perceptions of the Learning Catalytics platform

The students voluntarily recorded their perceptions of use of the LC platform using a validated evaluation tool.¹⁰ Approval to use the tool was sought from its original

authors before data collection.¹⁰

The evaluation tool (feedback on the use of the Audience Response System) consisted of three parts.¹⁰ The first part comprised two yes or no questions to determine whether the students enjoyed using the ARS platform and whether they answered all of the questions. The second part consisted of nine questions using a five-point Likert scale. The questions measured students' views on the efficacy of ARS use. The third part contained examined students' perceptions of the ability of teachers to track their learning through the ARS tool. It also asked whether the technology would be useful in other courses. Finally, the students were given the opportunity to comment in three open text boxes. The first text box asked whether students enjoyed using the ARS tool. The second asked, the reason that students did not participate in all the questions in cases they did. The third was for any other comments.

Data analysis

Data were analysed using SPSS software (version 20; IBM Corp., Armonk, NY, USA). Descriptive data analysis was performed to answer the research questions. In addition, the Mann–Whitney *U* test was used for comparative data analysis.

Results

Demographic data

All of the students who participated in this study were women in the second year of a nursing program at a public university in Saudi Arabia. The students were aged from 18–20 years (85 per cent) or 20–22 years (15 per cent; Figure 2).

Student performance in relation to Audience Response System questions

In total, 156 questions were posed by the ARS tool during 14 lectures that covered the learning outcomes of the communication skills course. An average of 14 ± 0.5 questions were asked in every lecture, with a fixed number of 10 questions repeated (Table 1). The lowest proportion of responses to any question was 80.8 per cent. No students refused to answer all of the questions in a session. The 10 questions repeated in two or more lectures were later analysed as shown in Table 1. A high percentage of correct answers was shown for all of the repeated questions. There was also a statistically significant increase in the percentage of students who answered five of the 10 questions correctly. There were no statistically significant decreases in the percentages of students who gave the correct answer to a question.

Survey of students' perceptions of the Audience Response System

As shown in Table 2, the nursing students voluntarily evaluated the use of ARS technology as a teaching method on the final day of the communication skills course. The response rate was 100 per cent. All students reported that they enjoyed using the ARS tool and 97.5 per cent stated that they answered all of the questions. Moreover, most students (98.3 per cent) strongly agreed that ARS use was an effective way to learn and that it helped them to understand key concepts of the course. Also, ARS use aided in the identification of learning needs, this was reported by the majority of the participants (92.5 per cent). The students added that the ARS tool helped them to focus, stimulated their interest within the lectures and assisted in integrating new concepts during classroom lectures (92.5 per cent, 95 per cent and 98.3 per cent, respectively). The students also reported that ARS use helped the educator to track their level of understanding by receiving instant feedback from students' performances in answering the lecture questions. Also, students agreed that it would be beneficial in other nursing courses in the program.

After completing the survey, the students were invited to provide qualitative feedback by answering questions in three text boxes using their smartphones and laptops. These questions aimed to determine students' feelings, insights and thoughts on the reasons that they enjoyed ARS use and, if appropriate, why they did not answer all of the questions. Table 3 summarizes the qualitative themes. Interestingly, the students' comments comprised 97 pieces of positive feedback and 11 pieces of negative feedback. Only three students did not complete all of the questions. The reasons given for this were loss of connection and insufficient time to choose an answer. Overall, the majority reported that they enjoyed this new way of learning, saying, 'It's a fun way to learn' and 'It helped my understanding and I was more focused' (Table 3). One student reported that they valued more interactive learning in lectures, stating, 'I am more active in the lecture and I understand it better this way'. Another student said that they appreciated the anonymity of the ARS platform, stating that they preferred 'privacy when answering the questions to avoid being judged'. One student stated that she understood the lecture better because of the ARS tool: 'I understand this lecture more than any other class'. Finally, one student stated that she enjoyed this way of learning because of the use of technology, referring to it as 'smart teaching'.

Discussion

In this study, we evaluated the use of ARS technology to

promote the understanding of communication skills among nursing students. According to our results, nursing students considered ARS use a fun way to learn that helped them with their learning needs and improved their understanding.

ARS technology enhanced students' knowledge according to results obtained for questions repeated in multiple sessions. Repeated questioning helped to strengthen their understanding of the main learning outcomes of the course by providing formative feedback after each question.

The benefits of ARS use were evident in students' positive attitudes to ARS use and supported by the reinforcement of students' teaching and learning expectations. These expectations included the preservation of anonymity, identification of individual learning needs and enhancement of understanding. Immediate formative feedback is beneficial for both students and educators.^{13,14} Educators are able to assess their students' level of understanding and improve their learning according to their needs.¹⁰ Meanwhile, students are able to reflect on their own learning needs from the start of the course, get immediate feedback on their performance in each lecture and practice and prepare for summative exams. Consequently, this will reduce students' levels of anxiety, improve the active learning process and promote life-long learning.⁸ Many teachers have reported that students who are taught using ARS technology are confident and enthusiastic learners.¹³ These findings are consistent with our own: as the students reported that they understood the topic better, their confidence improved. Getting students to interact using new ARS technologies such as the LC platform through their own gadgets such as smartphones, iPads and laptops was reported to be a fun way of learning by the participants of this study. Student engagement in the classroom is a fundamental goal of our nursing program because the students are only in their second year of study and have little background knowledge of communication skills. Therefore, it is critical that nursing students become confident, skilled and knowledgeable before moving on to other nursing courses such as medical surgical, child care and critical care courses.¹⁵ These results are similar to the findings of other researchers who stress the importance of active learning achieved by the implementation of ARS technology.^{7,15}

ARS use was also valuable for the educator in terms of its ability to track students' learning as well as their strengths and weaknesses. For example, the proportion of students whose first attempt to answer question 9: 'Where does role

stress arise from?' (Table 1) answered this correctly 42 per cent in the first instance. This alerted the educator to the fact that some students were struggling to understand this concept. Therefore, educators can make use of this information and provide further explanation and discussion of this topic in the next lecture. Subsequently, the educator can ask the same question again. Indeed, in response to further explanation and a second and third repetition of the question about role stress, there was a significant improvement in the proportion of correct responses (68 per cent and 97 per cent, respectively). Thus, rather than only memorization, this method of learning involves integration, appreciation and application of the taught concept across the whole course, termed 'deep learning' by Biggs.¹⁶ According to our results, all correct response rates increased with the following lectures.

According to the literature, students who are taught via an ARS tool retain more information than students who are not.¹⁷ Moreover, students who are taught via ARS use achieve higher results than students who are not.⁷ A study comparing the overall course achievements between students receiving traditional learning and those receiving ARS-based tuition is warranted.¹⁴ Furthermore, this study investigated nursing students' understanding of a communication skills course. It may also be beneficial to integrate ARS use into other nursing courses in the curriculum that are categorized as 'factual' which do not have clinical part and is only a theory course: for example, professionalism and ethics in nursing, fundamentals of nursing and principles of nursing management.

This study took place at one public university, which may affect the generalizability of the results. Adding a qualitative study using focus groups to understand students' attitudes, feelings and insights will enrich the results.

Conclusion

In this study, ARS technology was used to provide prompt feedback and was found to promote teaching and learning among undergraduate nursing students. ARS use enabled the identification of individual learning needs at an early stage in the course and enabled revision before summative final exams. It also improved students' confidence and understanding of key concepts. Moreover, students of different levels of understanding and learning styles were identified, tracked and given support with the help of ARS technology.

It is our recommendation that both national and international higher educational institutions continue to

emphasize the importance of providing students with formative feedback. In particular, bachelor of nursing programs should incorporate new technologies to provide formative feedback to future nurses. Equipping nursing students with these knowledge and skills could result in professional and confident future nurses, consequently improving the quality of patient care and safety.

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PEER REVIEW

Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

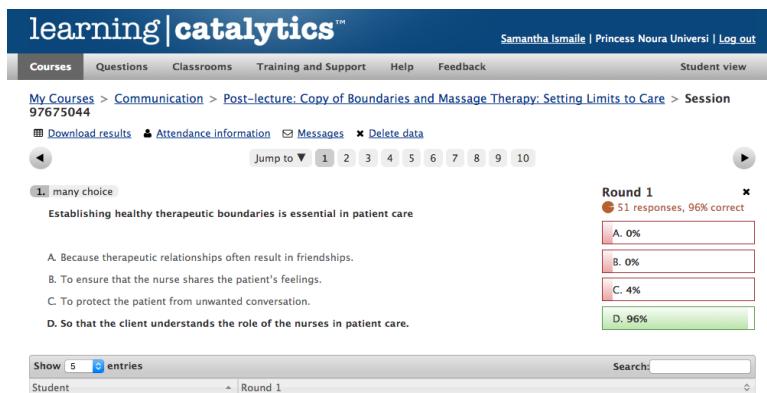
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ETHICS COMMITTEE APPROVAL

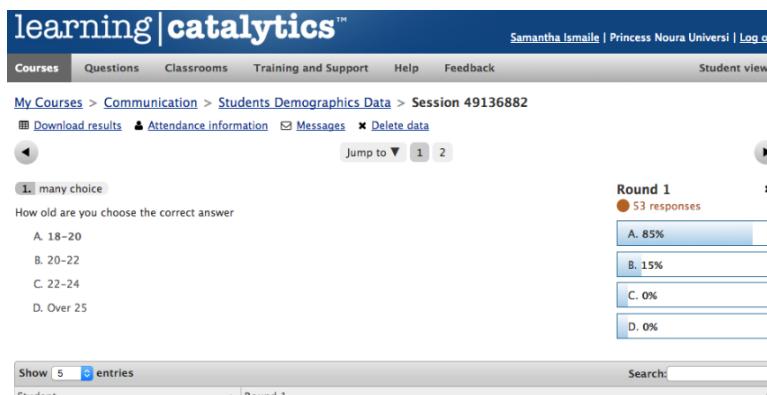
Ethics approval from the IRB committee, college of nursing at Princess Nourah bint Abdulrahman was sought out before the start of the study.

Figure 1: Snapshot of the Learning Catalytics webpage showing an example question and responses



The screenshot shows a Learning Catalytics interface. At the top, the navigation bar includes 'Courses', 'Questions', 'Classrooms', 'Training and Support', 'Help', 'Feedback', and 'Student view'. The user is Samantha Ismaile from Princess Noura Universi. Below the navigation, the URL is My Courses > Communication > Post-lecture: Copy of Boundaries and Massage Therapy: Setting Limits to Care > Session 97675044. There are links for 'Download results', 'Attendance information', 'Messages', and 'Delete data'. A navigation bar at the bottom allows jumping between rounds 1 through 10. The main content displays a question: "Establishing healthy therapeutic boundaries is essential in patient care". The question is labeled as "many choice". Below the question are four options: A. Because therapeutic relationships often result in friendships. (0%), B. To ensure that the nurse shares the patient's feelings. (0%), C. To protect the patient from unwanted conversation. (4%), and D. So that the client understands the role of the nurses in patient care. (96%). A summary indicates 51 responses, 96% correct. At the bottom, there are search and filter options: "Show 5 entries", "Search", and "Student Round 1".

Figure 2: Snapshot of the Learning Catalytics webpage showing students' responses to a question about their age



The screenshot shows a Learning Catalytics interface. The navigation bar and user information are identical to Figure 1. The URL is My Courses > Communication > Students Demographics Data > Session 49136882. The question is "How old are you choose the correct answer". The question is labeled as "many choice". Below the question are four options: A. 18-20 (85%), B. 20-22 (15%), C. 22-24 (0%), and D. Over 25 (0%). A summary indicates 53 responses. At the bottom, there are search and filter options: "Show 5 entries", "Search", and "Student Round 1".

Table 1: Students' performance in repeated questions

	Correct (%)			Statistical significance	
	Time 1	Time 2	Time 3		
1. Establishing healthy therapeutic boundaries is essential in patient care	83	94	100	NS	
2. Which of the following nurses' behaviours may put a patient at risk?	53	93	—	<0.001	Positive
3. If a patient presents you with a problem out of your scope of practice, the most professional response would be to:	51	96	—	<0.001	Positive
4. A client is in the middle of a painful divorce. She asks her nurse for advice on how to arrange a separation agreement. The most inappropriate way to answer the client's question would be to:	96.1	100	—	NS	
5. A nurse who discusses personal problems with patients and asks for advice would be deemed to be engaged in:	81	100	—	NS	
6. Professional boundaries protect the space between the professional's power and the client	49	98	—	<0.001	Positive
7. Boundary violations can result when there is confusion between the needs of the nurse and those of the client	42	97	—	<0.001	Positive
8. A warning sign of crossing a boundary with a patient is:	56	63	—	NS	
9. Role stress arises from:	42	68	97	<0.05	Positive
10. An example of barriers for effective professional relationship is:	45	97	—	<0.001	Positive

NS, not significant

Table 2: Nursing undergraduates' feedback on the use of the audience response system

	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
The ARS helped me to identify my learning needs	92.5	3.3	3.3	0.8	—
The ARS allowed the lecturer to track our understanding	43.3	55.8	0.8	—	—
The ARS helped me to maintain focus in lectures	92.5	5.8	1.7	—	—
Using the ARS stimulated my interest in the lectures	94.2	0.8	3.3	1.7	—
The ARS was useful in promoting my understanding of concepts	33.3	56.7	9.2	—	—
I found the repetition of key concepts in different sessions useful	76.7	23.3	—	—	—
The ARS was useful in promoting the integration of concepts	45	51.6	1.7	—	—
I think that the ARS would be useful in other nursing lectures	95	4.2	0.8	—	—
I think that the ARS would be useful in other parts of the nursing curriculum	15	83.3	0.8	0.8	—

ARS, Audience Response System

Table 3: Themes that emerged from qualitative feedback

Theme	Occurrence
The ARS identifies individual learning needs	123
The ARS is a fun way of learning	111
The ARS improves understanding	104
The ARS allows interactive teaching	31
The ARS is easy to use	37
The ARS encourages critical thinking and problem solving	24
The ARS allows anonymity	12
I enjoy using new teaching technology	7
The ARS aids with summative assessment preparation	4

ARS, Audience Response System