

Pharmacy Students' Views and Experiences of MyDispense TM : A Cross-Sectional Evaluation of a Simulation-Based Learning Tool in an Irish University

Owen D Collins

121361956@umail.ucc.ie

University College Cork

Ruth McCarthy

University College Cork

Harriet Bennett-Lenane

University College Cork

Lisa Buckley

University College Cork

Elaine Creech

University College Cork

Ken J. Devine

University College Cork

Suzanne McCarthy

University College Cork

Michelle O'Driscoll

University College Cork

Frank Olden

University College Cork

Laura J Sahm

University College Cork

Research Article

Keywords: MyDispense, computer-based simulation, pharmacy education, pharmacy students

Posted Date: June 19th, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9683874/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.
[Read Full License](#)

Additional Declarations: No competing interests reported.

Abstract

Introduction

MyDispense is an open-source, high-fidelity, low stakes, web-based community pharmacy simulation which allows students to develop their dispensing and counselling skills. During the 2025/26 academic year, University College Cork (UCC) School of Pharmacy integrated MyDispense into first- and second-year pharmacy practice modules.

Aim

The aim of this study was to investigate learners' views and experiences of MyDispense within an Irish university setting.

Methods

First- and second-year pharmacy students ($n = 155$) enrolled at UCC during the 2025/26 academic year were invited to participate in a cross-sectional survey study to gather student perceptions of MyDispense. Quantitative Likert-Scale responses were analysed in MS Excel using descriptive statistics. Open-ended questions were analysed in Excel via open-coding and Braun and Clarke reflexive thematic analysis. MyDispense usage reports were also imported into MS Excel to measure student engagement with the platform.

Results

Of 155 students, a total of 115 (74%) used the platform and of these students 96 (68%) agreed to participate in the study. Nearly all first-year (Y1 : 83%) and second year (Y2 : 87%) found MyDispense to be an interesting and engaging learning experience. Students agreed/strongly agreed that MyDispense increased confidence in clinical skills, such as patient counselling (81% Y1 ; 87% Y2) and medication dispensing (79% Y1; 97% Y2). Most students strongly agreed that MyDispense helped to prepare them for future placement and exams, however, only two-thirds of first- and second-year students agreed/strongly agreed that MyDispense helped prepare them for future practice as a pharmacist. Despite this, 82% of first year and 89% of second year student agreed/strongly agreed that they would like to use MyDispense in the future. Open-ended responses were mapped to three overarching themes; 1) Realism without Risk, 2) Experiential Learning Support, and 3) Student Accessibility and Onboarding.

Conclusion

While the outcome of this study highlights that students have a highly positive perception of MyDispense as a learning aid, further research is warranted to investigate the effectiveness of the platform in clinical pharmacy courses via correlation of MyDispense exercise completion and exam scores in order to measure its impact in meeting defined learning outcomes.

Background/Introduction

Pharmacists today have diverse roles requiring a breadth of competencies. The core skills of pharmacists in a patient facing role can include; medication dispensing, counselling and pharmaceutical care knowledge [1]. Practising safe dispensing is a key learning outcome of undergraduate pharmacy curricula worldwide to meet accreditation standards and enable registration with professional bodies and regulators [2]. As a core competency, the development of dispensing and consultation skills in pharmacy students requires access to clinical skills facilities, specialised resources and experiential learning placement opportunities.

The five-year integrated BPharm/MPharm Program in the Schools of Pharmacy (SOP) in Ireland includes a two week of experiential learning placement in year two of the program. These two weeks take place in community or hospital pharmacy to increase students' understanding of patient facing settings and potential future roles. In University College Cork (UCC), first year pharmacy students receive tutorials and workshops, where they discuss the advice and counselling that should be provided as it pertains to minor ailments e.g. heartburn, pain, requiring them to become familiar with over the counter (OTC) medicines. In the second year, they learn extemporaneous dispensing of medications. However, students have had relatively little exposure to dispensing of prescription only medicines (POM). Thus, students may face challenges when undertaking the placement in second year. The incorporation of a self-directed learning tool with pharmacy dispensing simulation, can be supportive and provide a more holistic clinical pharmacy learning experience [3,4].

The use of simulation offers an alternative to traditional methods used for teaching dispensing skills. It allows pharmacy students to practice and develop pharmaceutical care skills in a safe, controlled environment whereby they can learn actively from their mistakes [5–7]. Such platforms were used as a substitute to in-person workshops/lectures during the COVID-19 pandemic [8–10]. MyDispense is a pharmacy simulation software developed by the Faculty of Pharmacy and Pharmaceutical Sciences at Monash University in Victoria, Australia [11]. MyDispense is an open-source, high-fidelity, low stakes, web-based community pharmacy simulation which allows students to develop their dispensing and counselling skills, in a low-risk environment. During the 2025/26 academic year, UCC SOP faculty integrated MyDispense into first- and second-year pharmacy practice modules. MyDispense was chosen for multiple reasons, including evidence that it has global reach - implemented in over 200 institutions across 30 countries [11], enables students to develop dispensing skills with no risk of patient harm [12,13] and is an open-source platform, that allows sharing of materials and cases within the MyDispense community.

Since its introduction (2011), MyDispense has received positive feedback from students globally. Previous studies highlighted the development of safe dispensing skills, improved confidence, accessibility, and an engaging learning experience in comparison to paper-based cases [3,14–17]. However, barriers to MyDispense implementation such as additional workload, learning curve for both faculty and students, internet connectivity issues, and limited pharmacy practice applications, were also noted [9,18,19]. To our knowledge however, no study has yet been published investigating students' views in Ireland, on the platform. This study aimed to gather students' perceptions on MyDispense and the potential impact it could have on their learning experience in early years of clinical pharmacy practice.

Study Aims

To investigate learners' views and experiences of MyDispense within a third-level Irish undergraduate pharmacy university setting.

Study Objectives

The objectives of this study were to investigate:

- i)* students' perceptions of potential barriers/facilitators to MyDispense use in pharmacy education,
- ii)* the potential impact of MyDispense on student learning of clinical pharmacy practice skills i.e. patient counselling, identifying errors and omissions, dispensing,
- iii)* students views of MyDispense regarding preparation for future practice,
- iv)* how students would like to use MyDispense in future years of the BPharm course and,
- v)* identifying potential ways to improve MyDispense to support future implementation of the platform.

Materials and methods

Background and Development of content:

MyDispense was initially piloted by second- and third-year pharmacy students in the Academic Year (AY) 2024–2025. Informal feedback allowed for identification of anomalies and improvement of the platform for the Irish context. An overhaul of the UCC MyDispense platform was conducted in May/June 2025. Medication images of over 300 prescription-only medicines (POM) and approximately 200 over-the-counter (OTC) products available in Ireland were uploaded to the platform making it more reflective of an Irish pharmacy environment for students.

A total of 26 exercises were developed for the 2025/26 AY. Eight OTC exercises were made available to first year students. Thirteen OTC exercises, four dispensing exercises and three legislation exercises were assigned for second year students. The cases developed aligned to the module content and related

to minor ailments such as pain, paediatrics, and upper GI conditions in line with learning outcomes. Dispensing exercises required students to complete uncomplicated prescriptions alongside relevant resources available within the exercise e.g. antibiotic prescribing guidelines. Legislation exercises were made available to second years to allow them to complete legal checks on prescriptions. Prior to final implementation, cases were piloted and validated by faculty. Students were allowed to complete the exercises as many times as they wished received instant retrospective feedback upon exercise completion which was pre-populated by faculty within MyDispense during case scenario creation, alongside explanatory notes after exercise submission to reinforce learning.

Study Context & Participants

All first year and second year pharmacy students of the 2025/26 AY were invited to complete the relevant exercises on MyDispense to support their course content. Participants were provided with guidance on how to engage with, and complete, self-directed MyDispense exercises. They were supported by (i) tailored videos, (ii) an OTC medication grid, and (iii) a user manual available on Canvas, the UCC Virtual Learning Environment (VLE) to facilitate navigation of the platform. Once completed, all were invited to participate in this study via the Participant Information Leaflet (PIL) alongside a consent form (Appendix A). An electronic survey was distributed to first year students (Oct 2025) and second year students (Nov 2025). A reminder was sent two weeks later.

Research Instrument

A cross-sectional survey was developed to evaluate student perceptions of MyDispense during the 2025/26 academic year (Appendix B). Demographic data including sex and year of study were collected. A 20-question evaluation survey was designed using a combination of fifteen Likert-scale questions and five open-ended questions to qualitatively analyse textual responses. The survey was developed based on published literature evaluating student use of MyDispense to build upon established evidence and to allow for meaningful cross-study comparisons [15, 20, 21]. Student perceptions of MyDispense were collected by asking participants to rank statements using a five-point Likert scale (1 – strongly agree; 2 – agree; 3 – neither agree nor disagree; 4 – disagree; 5- strongly disagree). The Likert-scale questions focused on students' perception of whether MyDispense exercises helped them to learn more effectively and gain confidence in clinical practice, was an engaging/interesting way to learn, and if they would like to use it in future years of pharmacy study. Open-ended questions were included to obtain students' thoughts on their favourite and least favourite features of MyDispense and updates which could be made to improve future students experience of the platform.

Data Collection

The electronic survey was hosted online via Qualtrics^{XM} (Provo, UT, USA) a UCC supported platform. All student responses were anonymously encrypted. Data from the electronic questionnaire was collected

and imported into Microsoft (MS) Office Excel (Version 2602 Build 19725.20190) and Word 365 (Version 2510 Build 16.0.19328.20144). qualitative Likert-Scale responses were analysed using descriptive statistics e.g. frequency and mean in MS Excel. The completion data for the 25 MyDispense activities were downloaded as an activity completion report. This report detailed each student’s attempt and time per activity and was used to calculate frequencies to categorize students as low, medium and high users of MyDispense, based on the number of activities they completed. All qualitative answers to open-ended questions were imported to MSExcel for open coding and thematic analysis. Themes relevant to MyDispense use were subsequently identified from these responses by the reflexive thematic analysis approach outlined by Braun and Clarke [22, 23]. Each response was systematically coded and categorised by two independent reviewers (OC and LS), with initial themes generated through discussion prior to final theme definitions upon further review. Any conflicts that arose were resolved through a third party (RMcC), and discussions regarding themes were held until a final consensus was reached.

Ethics Approval

This study (2024 – 309) received ethical approval by the UCC Social Research Ethics Committee. Informed written consent was obtained by all participants prior to study participation.

Study Reporting

This study was reported according to the Standards for Quality Improvement Reporting Excellence in Education (SQUIRE-EDU) guidelines [24].

Results

Of the 155, first, and second year students invited to participate in the study, 96 (62%) completed the questionnaire and were included in this study. A response rate of 48% was recorded for the second-year student population (n = 79) compared to a response rate of 76% for first-year students (n = 76). Of the 96 eligible participants, 71 (74%) were female and 28 (26%) were male. Details of participant demographic characteristics are outlined below in Table 1.

Table 1
Demographic Characteristics of Participants
(n = 96)

Total no. of eligible participants	n (%)
First-year students	58 (60)
Second-year students	38 (40)
Gender	
Female	71 (74)
Male	25 (26)

Of 155 students invited to use MyDispense during the 2025/26 academic year, a total of 115 (74%) used the platform. A total of 641 MyDispense exercises were completed by both first- and second-year students during the September-December period in the 2025/26 academic year. On average, second year students completed fewer MyDispense exercises (n = 4), than first year students (n = 7). A table outlining exercise completion can be seen in Table 2.

Table 2
Number of MyDispense Exercises Completed by
Students (n = 115)

Total No. Of Exercises Completed	n (%)
1–3 (Low User)	51 (44)
4–6 (Average User)	24 (21)
> 6 (High User)	40 (35)

First-Year Likert Scale Results

First-year students responded on average ≤ 3 on all Likert scale questions, where 1 corresponded to strongly agree and 5 to strongly disagree, indicating a positive response to MyDispense. They found the flexible nature of MyDispense and the ability to asynchronously and autonomously learn clinical pharmacy skills at any place or time using their own devices to be positive. The vast majority (95%) of first years appreciated the safe learning environment of MyDispense with no risk of patient harm, especially in their foundational year as they begin to learn how to counsel patients on OTC medicines by using MyDispense. The majority reported that the feedback provided at the end of exercises facilitated their learning for future exercises and patient counselling. It is worth noting however, that only two thirds of first years agreed/strongly agreed that MyDispense helped to prepare them for future practice. Despite this uncertainty regarding future practice, 82% agreed/strongly agreed to use MyDispense in future course studies. Detailed responses can be seen below in Fig. 1.

Figure 1. First-year student perspectives on MyDispense. The figure demonstrates the percentage of students who agreed/disagreed with statements on the vertical axis.

Second-Year Likert Scale Results

These students responded on average ≤ 3 on the Likert scale to all statements. Positive responses focused on increased confidence dispensing medications and counselling patients. They reported very high agreement that MyDispense allowed them to prepare for both exams (92%) and placement (97%). One fifth of second-year students however disagreed/strongly disagreed that MyDispense would prepare them for future practice. A majority (89%) nonetheless, indicated that they would like to use MyDispense as part of the clinical pharmacy curriculum in the future to support their learning. Detailed responses can be seen below in Fig. 2.

Figure 2. Second-year student perspectives on MyDispense. The figure demonstrates the percentage of students who agreed/disagreed with statements on the vertical axis.

Learner's Perspectives on MyDispense

Following open coding of qualitative responses and reflexive thematic analysis, four overarching themes were identified : 1) Realism without Risk, 2) Experiential Learning Support, 3) Student Accessibility and Onboarding

Realism Without Risk

Both year groups appreciated the platform's authenticity and credible scenarios which allowed them to apply their knowledge with students noting that *"it feels very realistic"*. Students appreciated that MyDispense aided a consequence-free learning experience, enabling knowledge application and practice in a stress-free manner. MyDispense afforded students the opportunity to practice patient counselling and clinical pharmacy skills as a learning aid, in a low-stakes learning environment, unlike OSCE-style assessments, with examiners and actors, or professional practice in a community pharmacy. Students appreciated this approach, noting that it *"takes away the pressure"* whilst enhancing their learning experience overall - *"It set up a realistic pharmacy setting where we could learn and make mistakes in patient counselling without actually having the anxiety of performing in front of a real patient"*. Students also found the authentic environment of MyDispense engaging and immersive, as they enjoyed *"being able to pick the product off the shelf"* and *"how the products were all pictured and you could add them to your basket"* compared to paper-based patient cases. Some students liked how there was *"lots of products to choose from for OTC things, similar to a community pharmacy"*. The scenarios of the platform also promoted productive failure as students could make mistakes and improve their clinical competencies *"I like how you can keep attempting each time using what you learned"*

Experiential Learning

MyDispense enables students to gain experiential learning in a virtual environment and fosters the development of communication, dispensing and critical thinking skills required for professional registration. The experiential learning opportunity is helpful for those who may not have gained experience in community pharmacy – *“Gives me an opportunity to practise patient interactions because I don’t work in a pharmacy during the academic year”*. Students reported that MyDispense was an interactive and engaging way to apply practical skills and *“makes studying more interesting”*. The experiential learning nature of the platform may be a valuable support for kinaesthetic learners who learn-by-doing with one student noting that it is *“better than reading a book/slides. It engages active recall”*. Students reported that MyDispense contributed to their development of critical thinking skills while providing an enjoyable medium to engage with lecture material – *“It was a way of exploring cases and practising responses that was fun and made me think about everything I was asking and explaining”*. Some students expressed however, that the exercises felt *“kind of repetitive”* and would have appreciated a wider set of exercises to be made available - *“would like to see even more examples presented”*.

Student Accessibility and Onboarding

Most students reported MyDispense as highly accessible and that the *“interface was easy to use”*, highlighting the flexible and on-demand nature of the platform which allows for autonomous and asynchronous learning outside of the classroom – *“Flexible.... could do at any time and restart scenarios”*. Some appreciated certain design features of the platform such as the notepad feature which enabled one student *“to think through decisions before counselling”* as well as the instant feedback feature at the end of exercises which allows students to learn from their mistakes upon exercise completion – *“It’s a great idea. I liked the feedback from the tutors. It was a good way to learn.”*. Several students however, reported wanting *“more feedback”* and one student noted that they would have preferred real-time feedback to support their learning, in comparison to retrospective feedback provided at the end of exercises – *“I did not like how they did not tell you till the end whether you got the patient counselling right or not. Maybe you should be prompted if you get it wrong as you go along”*. Students liked the layout of the user interface and felt that the *“guided questions to ask the patient”* helped to develop clinical reasoning and consultation skills. Many experienced onboarding difficulties with the platform and felt it was *“difficult to use at first”*. Some reported initial difficulties finding medications and navigating the interface, reflecting a high degree of user front-loading as they familiarised themselves with the platform– *“It was difficult to use at first. On the paracetamol task I spent a considerable amount of time just searching for where the paracetamol even was. I didn’t seem to have a search button of any kind”*. Many students felt that the user interface was not intuitively labelled and expressed that *“things could be labelled better”*. Students reported that MyDispense was limited in its applications and found that technical issues negatively impacted the authenticity of the user learning experience – *“For two of the scenarios it didn’t record that I asked lots of questions that I did ask, and then I got poor feedback, but it wasn’t correct. It said I didn’t answer a patients question either, but I did. Students also reported that “sometimes the system would glitch”* and one expressed a preference in-person practice – *“Think in-person practice is better and more realistic”*. Students highlighted the limitation of the platform being usable via laptop devices and

that this impeded accessibility – *“I could only use it on my laptop. This meant I did not use it as often as I would’ve liked. It would be better if it was available as a mobile version that you could use on your phone.”*

Suggestions for Improvement

A synthesis of the responses included several recommendations for platform improvement ; (i) an enhanced user interface (UI), as it was not intuitive and *“clunky”*, recommending that a search function could be implemented to quickly find medicines off the shelf – *“An improved medicine storage could make navigation easier”*, (ii) the integration of Artificial Intelligence (AI) into counselling to provide real-time suggestions as well as to make feedback more tailored to users – *“The counselling feedback was not as specific as I thought it would be but obviously this would be difficult to manage. Maybe the use of AI could help improve this?”*, (iii) a dedicated mobile app for MyDispense and (iv) the ability to orally communicate with patients by having *“a talking feature”* that would enhance the authenticity of patient-pharmacist interactions in the platform.

Discussion

Based on our knowledge and current literature, this study is the first to examine pharmacy students’ perceptions of a novel, virtual community pharmacy simulation platform (MyDispense) in the context of an Irish third-level university setting. Student views of MyDispense were grouped into four overarching themes including i) Realism without risk, ii) Experiential Learning Support, and iii) Student Accessibility and Onboarding

The results of our survey indicated that Irish students had an overall positive perception of MyDispense and would like to continue using the platform in future years of study, suggesting it is perceived as a valuable and useful learning aid for pharmacy students. These perceptions were consistent with previous findings from other countries [9, 16, 20, 21, 25]. A recent global survey exploring students’ views on computer-based simulation (CBS) in pharmacy education highlighted that most students agree it is an enjoyable way to study (72.4%; $n = 177$) [19]. Students appreciated the realistic, interactive environment provided by MyDispense. It provides opportunity for active, multimodal and kinaesthetic learning i.e. learning-by-doing to enhance student motivation to learn, and metacognition [26, 27]. Interactive learning environments such as MyDispense. also align with Millers competency pyramid as they facilitate knowledge acquisition (*“Knows How”*) and knowledge application (*“Shows How”*) and can act as low-demand alternatives to OSCE-style assessments in pharmacy education [28, 29]. Students reported high agreement that MyDispense allows them to prepare for exams and placement, illustrating that the platform can support both academic and practical skills development simultaneously, as highlighted in other studies [9, 30]. Despite an overall positive perception to MyDispense as a learning platform, one third of first and second year students did not agree that it would help to prepare them for future practice, which may be reflective of their limited experience and uncertainty regarding what professional practice as a registered pharmacist entails. This result also aligns with previous findings in

the US and Australia, with one survey reporting that roughly one fifth of students (21.1%) strongly disagreed that MyDispense helped to prepare them for real-life dispensing [15, 20]. Students also expressed difficulties using the platform initially, particularly those in their first-year of study, as they also had to simultaneously learn how to navigate the university VLE, Canvas. It is worth noting however, that previous studies exploring student perceptions of MyDispense have noted that students usually feel there is a steep learning curve associated with the platform [3, 16, 17, 31].

Nearly all students appreciated the online accessibility of the platform and the flexibility MyDispense afforded as a platform for learning. This result echoes the shift towards online pedagogy following COVID-19, as students and educators alike, demonstrated heightened demand for suitable alternatives to face-to-face teaching [9, 21, 32]. It is worth mentioning that some students expressed frustration with minor technical issues, which may negatively impact the learning experience and overall accessibility of the platform - an issue commonly cited as a barrier in studies investigating student perceptions of MyDispense and other simulation platforms in pharmacy education [20, 31–35]. Furthermore, as the role of the pharmacist continues to expand, with increased emphasis on clinical services aimed at making healthcare more accessible to the community, it is critical to enhance the student learning experience via simulation platforms, such as MyDispense, as traditional methods may limit the development and teaching of practical skills and competencies required for this evolving role in the future [9, 36–38]. MyDispense also aligns with educational frameworks and competency standards by allowing students to develop their dispensing skills, clinical-reasoning skills, prescription validation abilities and patient communication skills, as reflected from feedback gathered from student [1, 39]. MyDispense use within pharmacy programs may also help to develop digital health literacy skills which have increasingly become a necessary competency included in healthcare curricula in order to ensure safe and effective patient care [40].

MyDispense provides instant feedback, following exercise completion, which most students appreciated as it provides them with self-learning opportunities [20, 41]. Our results highlighted however, that some students felt the feedback was generic and that there was a potential role for AI, to provide tailored feedback for students in real time. Despite recent advancements, Artificial Intelligence in Education (AIEd) remains in its early stages, with significant barriers and obstacles as third-level institutes grapple with AI usage statements and policies [42]. Although AIEd may ultimately reduce workloads for educators, careful consideration is required for its integration into platforms such as MyDispense, as it may reduce (i) academic input and potentially (ii) the critical thinking and logical reasoning skills necessary for students to become competent professionals as future pharmacists [43].

Limitations

While the results overall, are in favour of future implementations of MyDispense into pharmacy curricula, as students had a mostly positive perception of the platform, careful interpretation of the results is required by educators wishing to use the platform. Firstly, the majority of our participants (74%) were female, which although reflective of the gender split observed in healthcare courses in Ireland,

nonetheless may not adequately reflect male views [44]. Our findings may not reflect the depth and breadth of challenges or benefits, associated with the platform, as approximately two in five students completed fewer than three exercises. This limited interaction may mean that these participants did not receive sufficient exposure to MyDispense to give a holistic perception of the platform. Students' perceptions may also have been affected by positive cognitive bias i.e. they were allowed to repeat exercises, without penalty, and thus improve the feedback they received, reflective of the self-orientated perfectionist nature of students in healthcare courses [45].

Conclusion

This study identified that students perceive MyDispense as a valuable learning support in pharmacy education and are beneficial to students as part of their curriculum, as most would like to continue to use the platform. Student feedback highlighted that the platform developed both clinical knowledge and practical skills required for professional registration and therefore such platforms should be considered by educators for increased use in clinical pharmacy programs. Despite these insights from students however, most felt that it did not adequately prepare them for future practice, which may be due to their limited professional experience and early stage of learning. Educators wishing to implement the program should also be aware of potential barriers to MyDispense use by students, such as ensuring that a wide range of exercises are created for the platform to increase student satisfaction rates. As MyDispense is an open-access software, sharing of exercises is available between third-level institutions which may overcome this barrier expressed by our students in the survey. Suggested improvements for the student experience whilst using MyDispense identified from this study were (i) making the user interface (UI) more intuitive to reduce user front-loading, and (ii) further development of the platform by stakeholders to increase student satisfaction rates. The possibility of developing a dedicated mobile app to further increase the platform's accessibility for students could be explored. While the outcome of this study ultimately highlights that students have a highly positive perception of MyDispense as a learning aid, further research to investigate the effectiveness of the platform in clinical pharmacy relative to exam scores may help assess its impact on learning.

Declarations

Human Ethics and Consent to Participate declarations:

This study (2024 – 309) received ethical approval by the UCC Social Research Ethics Committee. The methods were performed in accordance with the Declaration of Helsinki. Informed written consent was obtained by all participants prior to study participation (Appendix A).

Consent for Publication

Not applicable.

Competing Interests

The authors declare that they have no competing interests for this research.

CRediT Authorship Contribution Statement

Owen Collins : Writing – Original Draft, Writing – review & editing, Visualization, Methodology, Investigation, Data curation, Software. *Ruth McCarthy* : Writing – review & editing, Visualization, Supervision, Project administration, Methodology, Conceptualization, Software. *Harriet Bennette-Lenane* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Lisa Buckley* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Elaine Creech* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Ken J. Devine* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Suzanne McCarthy* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Michelle O'Driscoll* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Frank Olden* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Laura J. Sahm* : Writing – review & editing, Visualization, Supervision (lead), Project administration, Methodology, Conceptualization, Software.

Funding

This research received no external funding.

Author Contribution

CRediT Authorship Contribution Statement *Owen Collins* : Writing – Original Draft , Writing – review & editing, Visualization, Methodology, Investigation, Data curation, Software. *Ruth McCarthy* : Writing – review & editing, Visualization, Supervision, Project administration, Methodology, Conceptualization, Software. *Harriet Bennette-Lenane* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Lisa Buckley* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Elaine Creech* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Ken J. Devine* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Suzanne McCarthy* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Michelle O'Driscoll* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software. *Frank Olden* : Writing – Review and editing, Visualisation, Methodology, Conceptualization Project administration, Software.

Acknowledgements

This authors would like to acknowledge Keith Sewell and the technical team at Monash University for their support and guidance while adapting MyDispense to the Irish community pharmacy cultural context to make the simulation more realistic for our students. The authors would also like to thank all the clinical pharmacy faculty at the School of Pharmacy (SoP) in University College Cork (UCC) for their input and contributions during set-up and validation of dispensing case scenarios in the simulation.

Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

References

1. Pharmaceutical Society of Ireland (PSI). Code of Conduct- Professional Principles, Standards and Ethics for Pharmacists [Internet]. Ireland: Pharmaceutical Society of Ireland (PSI), 2019 [cited 2026 February 11th] Available from : <https://www.thepsi.ie/practice-supports/code-conduct>
2. Pharmaceutical Society of Ireland (PSI). Accreditation Standards for the Five Year Master's Degree Programmes in Pharmacy; Pharmaceutical Society of Ireland (PSI): Dublin, Ireland, 2023 [cited 2026 February 11th] Available from: <https://www.psi.ie/education-and-training/training-become-pharmacist-ireland/accreditation-and-standards-0>
3. Nguyen KT, Dao ML, Nguyen KN, Nguyen HN, Nguyen HT, Nguyen HQ. Perception of learners on the effectiveness and suitability of MyDispense: a virtual pharmacy simulation and its integration in the clinical pharmacy module in Viet Nam. BMC Med Educ. 2023;23:790. <https://doi.org/10.1186/s12909-023-04773-5>.
4. Hall K, Musing E, Miller DA, Tisdale JE. Experiential Training for Pharmacy Students: Time for a New Approach. Can J Hosp Pharm [Internet]. 2012. <https://doi.org/10.4212/cjhp.v65i4.1159>. [cited 2025 Mar 23];65.
5. Crea KA. Practice skill development through the use of human patient simulation. Am J Pharm Educ United States. 2011;75:188. <https://doi.org/10.5688/ajpe759188>.
6. Lin K, Travlos DV, Wadelin JW, Vlasses PH. Simulation and introductory pharmacy practice experiences. Am J Pharm Educ United States. 2011;75:209. <https://doi.org/10.5688/ajpe7510209>.
7. Coyne L, Merritt TA, Parmentier BL, Sharpton RA, Takemoto JK. The Past, Present, and Future of Virtual Reality in Pharmacy Education. Am J Pharm Educ United States. 2019;83:7456. <https://doi.org/10.5688/ajpe7456>.

8. Durand E, Kerr A, Kavanagh O, Crowley E, Buchanan B, Bermingham M. Pharmacy students' experience of technology-enhanced learning during the COVID-19 pandemic. *Explor Res Clin Soc Pharm.* 2023;9:100206. <https://doi.org/10.1016/j.rcsop.2022.100206>.
9. Slater N, Mason T, Micallef R, Ramkhelawon M, May L. Enabling Access to Pharmacy Law Teaching during COVID-19: Student Perceptions of MyDispense and Assessment Outcomes. *Pharmacy.* 2023;11:44. <https://doi.org/10.3390/pharmacy11020044>.
10. Seybert AL, Smithburger PL, Benedict NJ, Kobulinsky LR, Kane-Gill SL, Coons JC. Evidence for simulation in pharmacy education. *JACCP J Am Coll Clin Pharm.* 2019;2:686–92. <https://doi.org/10.1002/jac5.1167>.
11. MyDispense. – Shaping Pharmacy Education [Internet]. [cited 2025 Nov 5]. <https://info.mydispense.monash.edu/>. Accessed 5 Nov 2025.
12. Smith MA, Mohammad RA, Benedict N. Use of Virtual Patients in an Advanced Therapeutics Pharmacy Course to Promote Active, Patient-Centered Learning. *Am J Pharm Educ.* 2014;78:125. <https://doi.org/10.5688/ajpe786125>.
13. Phanudulkitti C, Kebodeaux C, Vordenberg SE. Use of the Virtual Simulation Tool 'MyDispense' By Pharmacy Programs in the United States. *Am J Pharm Educ.* 2022;86:ajpe8827. <https://doi.org/10.5688/ajpe8827>.
14. Nicolazzo JA, Chuang S, Mak V. Incorporation of MyDispense, a Virtual Pharmacy Simulation, into Extemporaneous Formulation Laboratories. *Healthcare.* 2022;10:1489. <https://doi.org/10.3390/healthcare10081489>.
15. Shin J, Tabatabai D, Boscardin C, Ferrone M, Brock T. Integration of a Community Pharmacy Simulation Program into a Therapeutics Course. *Am J Pharm Educ.* 2018;82:6189. <https://doi.org/10.5688/ajpe6189>.
16. Ferrone M, Kebodeaux C, Fitzgerald J, Holle L. Implementation of a virtual dispensing simulator to support US pharmacy education. *Curr Pharm Teach Learn.* 2017;9:511–20. <https://doi.org/10.1016/j.cptl.2017.03.018>.
17. Waghel RC, Wilson JA. Exploring community pharmacy work experience impact on errors and omissions performance and MyDispense perceptions. *Curr Pharm Teach Learn.* 2025;17:102235. <https://doi.org/10.1016/j.cptl.2024.102235>.
18. Singh HK, Mak V, Sewell K, Malone DT. Barriers and facilitators to implementing simulation into pharmacy programs globally. *J Pharm Policy Pract.* 2023;16:26. <https://doi.org/10.1186/s40545-023-00531-6>.
19. Gharib AM, Bindoff IK, Peterson GM, Salahudeen MS. Exploring global perspectives on the use of computer-based simulation in pharmacy education: a survey of students and educators. *Front Pharmacol.* 2024;15:1494569. <https://doi.org/10.3389/fphar.2024.1494569>.
20. McDowell J, Styles K, Sewell K, Trinder P, Marriott J, Maher S, et al. A Simulated Learning Environment for Teaching Medicine Dispensing Skills. *Am J Pharm Educ.* 2016;80:11. <https://doi.org/10.5688/ajpe80111>.

21. Phanudulkitti C, Leelakanok N, Nakpun T, Kittisopee T, Farris KB, Vordenberg SE. Impacts of the dispensing program(MyDispense[®]) on pharmacy students' learning outcomes with relevant perceptions: A quasi-intervention study. Thai J Pharm Sci [Internet]. 2024 [cited 2025 Mar 15];48. <https://doi.org/10.56808/3027-7922.2908>
22. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3:77–101. <https://doi.org/10.1191/1478088706qp063oa>.
23. Braun V, Clarke V. Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a *knowing* researcher. Int J Transgender Health. 2023;24:1–6. <https://doi.org/10.1080/26895269.2022.2129597>.
24. Ogrinc G, Armstrong GE, Dolansky MA, Singh MK, Davies L. SQUIRE-EDU (Standards for Quality Improvement Reporting Excellence in Education): Publication Guidelines for Educational Improvement. Acad Med. 2019;94:1461–70. <https://doi.org/10.1097/ACM.0000000000002750>.
25. Rude TA, Eukel HN, Ahmed-Sarwar N, Burke ES, Anderson AN, Riskin J, et al. An Introductory Over-the-Counter Simulation for First-Year Pharmacy Students Using a Virtual Pharmacy. Am J Pharm Educ. 2023;87:ajpe8940. <https://doi.org/10.5688/ajpe8940>.
26. Gleason BL, Peeters MJ, Resman-Targoff BH, Karr S, McBane S, Kelley K, et al. An Active-Learning Strategies Primer for Achieving Ability-Based Educational Outcomes. Am J Pharm Educ. 2011;75:186. <https://doi.org/10.5688/ajpe759186>.
27. Frost SH. Academic advising for student success: A system of shared responsibility. Washington, D.C: School of Education, George Washington Univ; 1991.
28. Miller GE. The assessment of clinical skills/competence/performance. Acad Med. 1990;65:S63–7. <https://doi.org/10.1097/00001888-199009000-00045>.
29. Vyas D, Bray BS, Wilson MN. Use of Simulation-based Teaching Methodologies in US Colleges and Schools of Pharmacy. Am J Pharm Educ. 2013;77:53. <https://doi.org/10.5688/ajpe77353>.
30. Lim AS, Lee SWH, Karunaratne N, Caliph S. Pharmacy Students' Perceptions and Performance on the Use of an Online Virtual Experience Tool for Practicing Objective Structured Clinical Examinations. Am J Pharm Educ. 2020;84:7920. <https://doi.org/10.5688/ajpe7920>.
31. Ambroziak K, Ibrahim N, Marshall VD, Kelling SE. Virtual simulation to personalize student learning in a required pharmacy course. Curr Pharm Teach Learn. 2018;10:750–6. <https://doi.org/10.1016/j.cptl.2018.03.017>.
32. Amatong AJ, Asentista H, Diasnes CM, Erispe KD, Malintad K, Paderog HG et al. Learners' Perceptions on My Dispense Virtual Simulation in the Philippines. 2022;7.
33. Dameh M. A Report of Second Year Pharmacy Students' Experience after Using a Virtual Dispensing Program. 2015.
34. Bindoff I, Ling T, Bereznicki L, Westbury J, Chalmers L, Peterson G, et al. A Computer Simulation of Community Pharmacy Practice for Educational Use. Am J Pharm Educ. 2014;78:168. <https://doi.org/10.5688/ajpe789168>.

35. Al-Dahir S, Bryant K, Kennedy KB, Robinson DS. Online Virtual-Patient Cases Versus Traditional Problem-Based Learning in Advanced Pharmacy Practice Experiences. *Am J Pharm Educ*. 2014;78:76. <https://doi.org/10.5688/ajpe78476>.
36. Cruz CFDS, Araújo DCSAD, Santos CTDJ, Onozato T, Araújo-Neto FDC, Lyra DPD Jr. Effectiveness of teaching and evaluation methods of clinical competencies for pharmacy: A systematic review. *Curr Pharm Teach Learn*. 2024;16:102182. <https://doi.org/10.1016/j.cptl.2024.102182>.
37. Hussainy SY, Styles K, Duncan G. A Virtual Practice Environment to Develop Communication Skills in Pharmacy Students. *Am J Pharm Educ*. 2012;76:202. <https://doi.org/10.5688/ajpe7610202>.
38. Lloyd M, Watmough S, Bennett N. Simulation-based training: Applications in clinical pharmacy. *Clin Pharm*. 2018;10:3–10.
39. Commission Delegated Directive (EU.) 2024/782 of 4 March 2024 amending Directive 2005/36/EC of the European Parliament and of the Council as regards the minimum training requirements for the professions of nurse responsible for general care, dental practitioner and pharmacist.
40. Car J, Ong QC, Erlikh Fox T, Leightley D, Kemp SJ, Švab I, et al. The Digital Health Competencies in Medical Education Framework: An International Consensus Statement Based on a Delphi Study. *JAMA Netw Open*. 2025;8:e2453131. <https://doi.org/10.1001/jamanetworkopen.2024.53131>.
41. Steuber TD, Janzen KM, Walton AM, Nisly SA. Assessment of Learner Metacognition in a Professional Pharmacy Elective Course. *Am J Pharm Educ*. 2017;81:6034. <https://doi.org/10.5688/ajpe6034>.
42. Hwang G-J, Xie H, Wah BW, Gašević D. Vision, challenges, roles and research issues of Artificial Intelligence in Education. *Comput Educ Artif Intell*. 2020;1:100001. <https://doi.org/10.1016/j.caeai.2020.100001>.
43. Vieriu AM, Petrea G. The Impact of Artificial Intelligence (AI) on Students' Academic Development. *Educ Sci*. 2025;15:343. <https://doi.org/10.3390/educsci15030343>.
44. HEA annual report. 2025 [Internet]. <https://hea.ie/statistics/data-for-download-and-visualisations/key-facts-figures-report/>
45. Henning K, Ey S, Shaw D. Perfectionism, the impostor phenomenon and psychological adjustment in medical, dental, nursing and pharmacy students. *Med Educ*. 1998;32:456–64. <https://doi.org/10.1046/j.1365-2923.1998.00234.x>.

Figures

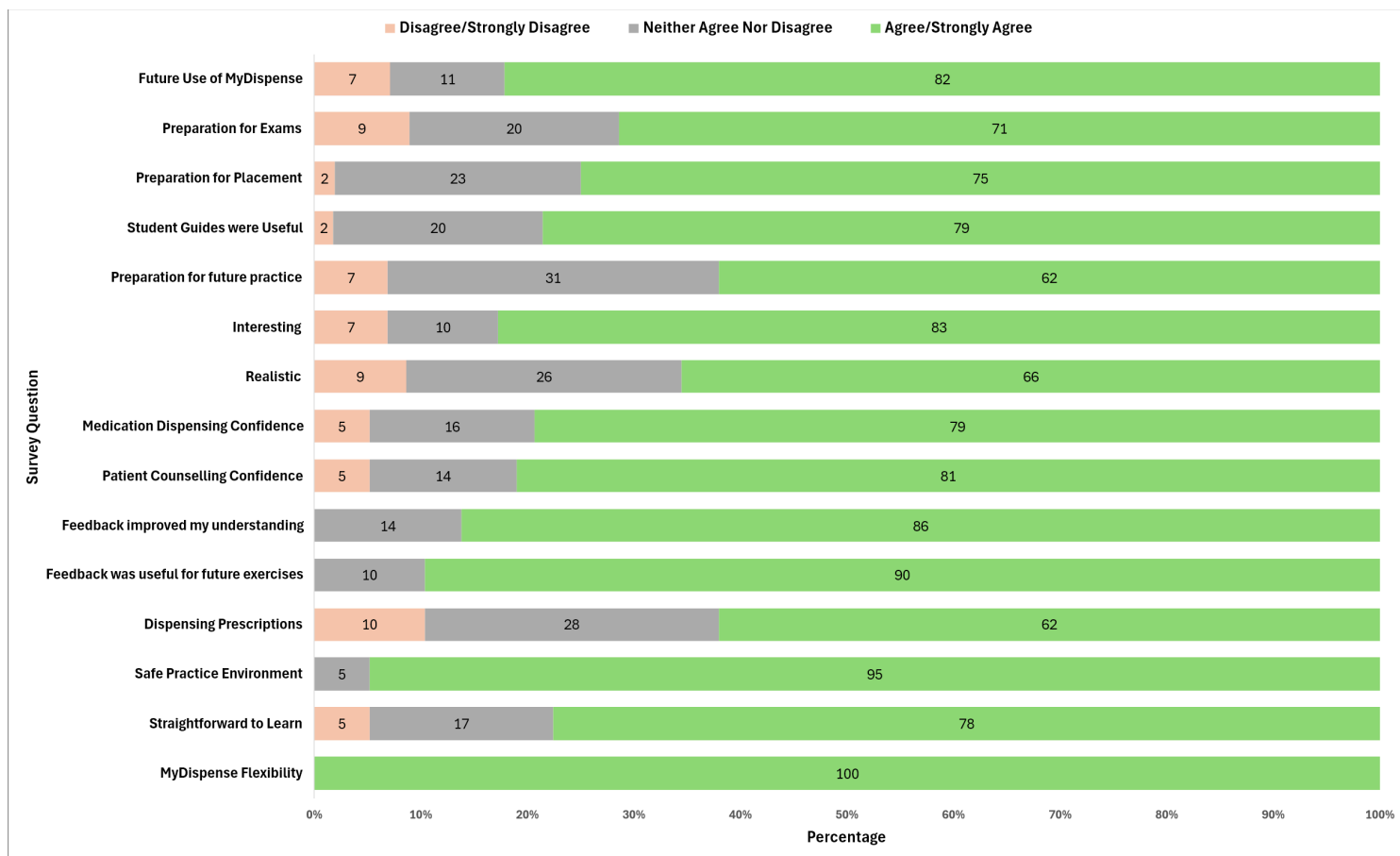


Figure 1

First-year student perspectives on MyDispense. The figure demonstrates the percentage of students who agreed/disagreed with statements on the vertical axis.

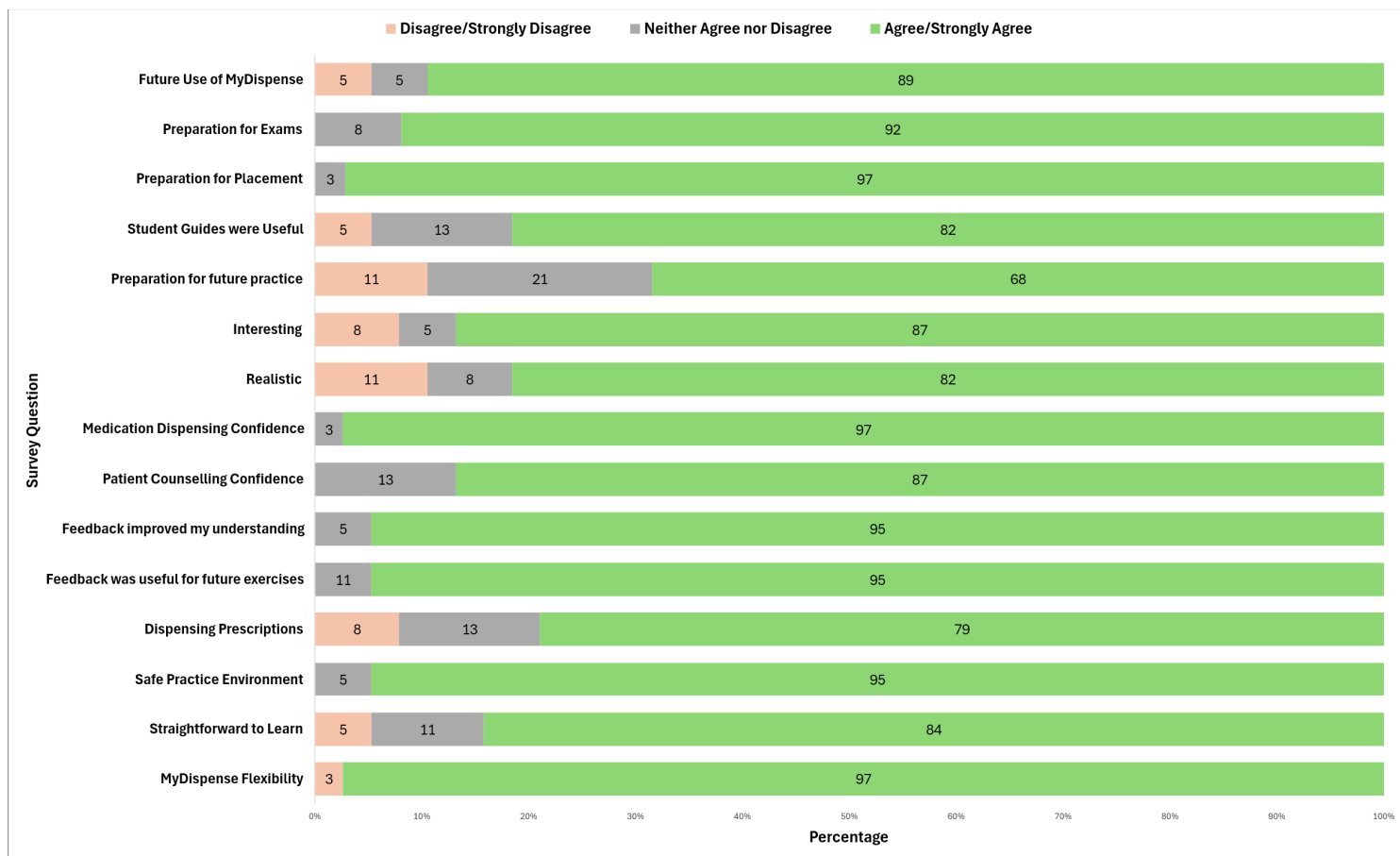


Figure 2

Second-year student perspectives on MyDispense. The figure demonstrates the percentage of students who agreed/disagreed with statements on the vertical axis.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AppendixA.docx](#)
- [AppendixB.docx](#)