LEARNER'S PERCEPTION OF ARTICULATE RISE IN ASYNCHRONOUS ONLINE LEARNING (AOL) FOR PHARMACOTHERAPY

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Abstract[VV1]

Flipped classroom, widely adopted in education, commences with asynchronous online learning (AOL), followed by in-session workshops to further reinforce learner-centric pedagogies. Effective AOL requires meaningful, memorable, and motivational content to encourage self-directed learning. Traditional didactic pre-recorded lectures often lack interactivity and immediate feedback, hindering active learning and knowledge retention. Articulate Rise, an educational technology (EdTech) platform, addresses these issues by incorporating multimedia elements and interactive activities, to enhance the learning experiences. This mixed-method study explores whether Articulate Rise is an effective EdTech tool for improving the learning experiences for pharmacotherapy learners.

Year 2 Diploma in Pharmaceutical Science learners from the School of Applied Science, Nanyang Polytechnic, participated in learning experience surveys before and after participating instructor-designed pharmacotherapy AOLs via Articulate Rise. The effectiveness of the design was quantitatively measured with a survey referencing the 3M (Meaningful, Motivational, Memorable) quality dimensions, on a 5-point Likert scale. Differences between the results of the two surveys and the reliability of the findings were assessed at a significance of $p = 0.05$. Learners' perceptions of the strengths, challenges, and areas for improvement in AOL were gathered and thematically analysed to gather qualitative insights into the effectiveness of Articulate Rise – adopted as an EdTech Tool - in improving pharmacotherapy learning experiences.

81 (93.1% response rate) and 74 (85.1% response rate) learners participated in the pre- and post-surveys, respectively. No significant differences were found in the composite measures of the 3Ms between the two groups. Good internal consistency between the components and each of the 3Ms was established, confirming the survey's reliability in assessing the AOL's effectiveness. Learners also found that the AOL lessons flow clearly, are flexible for self-paced learning, and the embedded activities enhance interactivity and understanding. Sub-analysis revealed a significant reduction in 'attention' in Articulate Rise ($M = 3.71$, $SD = 1.07$, $p = 0.043$] as opposed to viewing pre-recorded lectures ($M = 4.07$, $SD = 0.75$, $p = 0.043$). Also, issues in the learning packages, such as reliance on audio features without adequate visual explanation, and navigation difficulties, were notable challenges among learners.

Articulate Rise may potentially enhance the learning experience of pharmacotherapy learners in AOL. However, it requires intentional enhancements to audio-visual explanations and user-friendliness to retain learners' engagement and attention and maximise its potential in AOL. Ongoing iterative improvements may potentially maximise the effectiveness of Articulate Rise in AOL within and beyond pharmacy education.

Keywords: *Articulate Rise, Asynchronous Learning, EdTech, Pharmacotherapy, Pharmacy Education*

Introduction

[VV2]

Pharmacy education has undergone a paradigm shift, transitioning from lecture-based methods to an active-learning, learner-centric approach (Husband, Todd & Fulton, 2014). A proliferating and popular approach, Cui et al., (2023) defined flipped classroom as "a method that instructors expose pre-work to learners outside of class, and then use class time to arrange harder work to assimilate knowledge". By incorporating educational technologies (EdTech) in asynchronous online learning (AOL) with solving case studies during face-to-face tutorials, the flipped classroom approach is linked to improve academic outcomes, including higher course grades, enhanced examination scores, and better pre- and post-test performance (Cui et al., 2023; Chen et al.; 2018; Hew et al., 2018). Despite the growing emphasis on digital learning tools, limited research has been conducted on the effectiveness of Articulate Rise in AOL environments, particularly in pharmacy education. This study aims to evaluate learner's experience associated with Articulate Rise in AOL segment of the flipped learning approach in a pharmacotherapy module.

Literature Review

Challenges in AOL

In AOL, Cui et al. (2023) highlighted that traditional instructional model, such as pre-recorded lectures, are often passive, lengthy and lacks engagement. This likely attributed to a limited capacity of the working memory and the lack of active processing to internalise the information, which are criteria listed in theories of the Cognitive Theory of Multimedia Learning (Mayer, 2014; Mayer, 2019). Efforts to reduce extraneous processing, manage essential processing and foster generative processing are necessary to meet the goal of instructional design for an AOL (Mayer, 2018).

Educational Technology Solutions

Articulate Rise is an EdTech platform that incorporates multimedia elements and interactive activities to enhance AOL experiences (Articulate, n.d.). The block-based system supports multimedia integration, bite-sized content creation and hands-on interactive activities to facilitate information retention and comprehension (Articulate, n.d.). These LMS-compatible learning packages can be imported into different LMS for seamless, user-friendly access of interactive content for the learners. This avoids the need to toggle between browsers or browser windows (Articulate, n.d.). The design principles of Articulate Rise correspond with the Cognitive Theory of Multimedia Learning, which emphasizes how instructional design should align with cognitive information processing (Mayer, 2019). While similar EdTech tools have shown promise in pharmacy education - such as Articulate Storyboard 360's successful implementation in scaffolded inverse blended learning (SIBL) that led to enhanced student performance (Ang, 2020) - research specifically examining the effectiveness of Articulate Rise 360 remains limited.

Research Questions

Given the growing emphasis [VV3][TT4] on digital learning tools, the intuitiveness of Articulate Rise 360's web-based development that offers a modern learning experience, this study aims to evaluate learner's experience associated with Articulate Rise in AOL segment of the flipped learning approach in a pharmacotherapy module from two angles:

1) How does Articulate Rise 360 enhance the learner's perception in AOL, as compared to conventional, pre-recorded lectures (CPL)?
2) What features of Articulate Rise 360 learning package encourage or limit self-directed learning in AOL, compared to CPL?

Methods

In this exploratory, prospective, mixed-method study, 87 second-year learners enrolled in the Diploma in Pharmaceutical Science program at Nanyang Polytechnic (NYP), Singapore, participated in the study. These learners were conveniently sampled, based on the enrolment into "*Anti-Infectives & Medication Therapy in ENT and Musculoskeletal Disorders*" (MTEMD) module. MTEMD is a 5-credit module comprising 75 hours of instruction over 15 weeks. The first fourteen weeks consist of curriculum lessons, while the final week is designated as an examination week. During Weeks 1 to 7, learners interacted with traditional, pre-recorded AOL materials available on the D2L BrightSpace learning management system (LMS). In Weeks 8 to 16, learners transitioned to an AOL learning package designed with Articulate Rise 360; Articulate Rise 360 was selected for the study as it is one of the key educational technology tools subscribed to by Nanyang Polytechnic. Each week, learners were provided with an Articulate Rise 360 learning package accompanied by lecture notes to facilitate their lesson preparation for the face-to-face in-class workshops.

The "*3M Quality Dimensions for Engaging Learning*" questionnaire (Nanyang Polytechnic, 2022) presented in iSATE 2024 with the topic of "*Learning Experience Design (LXD) for Learner Engagement"*, measured on a 5-points Likert scale, was used to ascertain the learner's perception of the AOL approach (**Figure 1**). Briefly, the 3M Quality Dimensions described "meaningful", "motivation" and "memorable" as the three key outcomes of engaged learning, to develop the ability and passion for self-directed learning. These outcomes are supported by eight quality dimensions, each playing a crucial consideration in attaining the 3M outcomes of engaged learning. The questionnaires were issued at Week 8 (pre-survey) and 16 (post-survey) to examine the learner's perception at baseline and after undergoing AOL via Articulate Rise, respectively. Qualitative data was collected in Week 16, to solicit strengths, limitations and the area of improvements of the learning package.

Quantitatively, Mann-Whitney U-Test was performed, using Stats Kingdom (Stats Kingdom, n.d.), to test for differences in the 3M outcomes and the eight quality dimensions between the Pre- and Post-Survey to discern for any difference in learner's engagement between pre-recorded lectures and Articulate Rise 360 learning packages. All statistical tests were performed as a two-tailed test, with a statistical significance of $p = 0.05$. The qualitative feedback solicited at Week 16 were analysed and thematically classified by two contributors. The responses were grouped into common categories based on their content. The themes were cross reviewed by the contributors. Any disagreements in classification were discussed and resolved them before finalizing the data to ensure consistency and accuracy in the analysis.

Results and Discussion

Of the 87 learners, 81 (93.1% response rate) completed the pre-survey, while 74 (85.1% response rate) participated in the post-survey. The study found that the interactive Articulate Rise learning package is as equally effective in supporting their learning experiences in

pharmacotherapy as the traditional, pre-recorded lectures[S(5)][TT6].

3M Domains	3M Quality Dimensions		Definitions of 3M Quality Dimensions
1. Meaningful *Incorporate real-life contexts that facilitate active, constructive, intentional & collaborative engagement, by integrating cognitive (thinking), affective (feeling), and psychomotor (doing) domains, to develop competency & purposeful learning.* [1, 2, 9]	1.1	**Application**	The ability to use learned material in new and real-life situations. This may include the application of rules, methods, concepts, principles, laws, and theories. [3]
	1.2	**Problem-Solving**	The synthesis of learning and application in new and different situations to propose solutions and consider alternatives to a problem.[4]
	1.3	**Collaboration**	The learning that occurs when two or more students learn together through dialogue and social interaction, considering each other's perspectives and experiences to solve problems and develop a shared understanding of meanings. [5,6]
2. Motivational *Motivational lesson design clarifies the flow of the lesson and incorporates scaffolding and activities that encourage learners to participate and engage in learning.* [10, 12]	2.1	**Attention**	The behavioural process in capturing and sustaining learners' interest while stimulating curiosity towards learning.
	2.2	**Autonomy**	The sense of empowerment, providing our learners achievable choices and endorsement in a task. [15]
	2.3	**Confidence**	The sense of mastery over a task or domain when learners believe that their success is a direct result of the progressive effort they put in.
3. Memorable *Learners can appreciate and connect their learning with the outcomes and the curriculum.*	3.1	**Appreciation**	The understanding of the purpose and importance of lesson outcomes as learners go through the learning process. [16]
	3.2	**Connection**	The engagement of learners emotively & cognitively.[16, 20, 21, 22]

Figure 1: The 3M Quality Dimensions for Engaging Learning indicates Meaningful, Motivational and Memorable as the key outcomes of learning experience design. Each key outcome is supported by two to three quality dimensions, serving as a criterion of consideration in learning experience design (Nanyang Polytechnic, 2022).

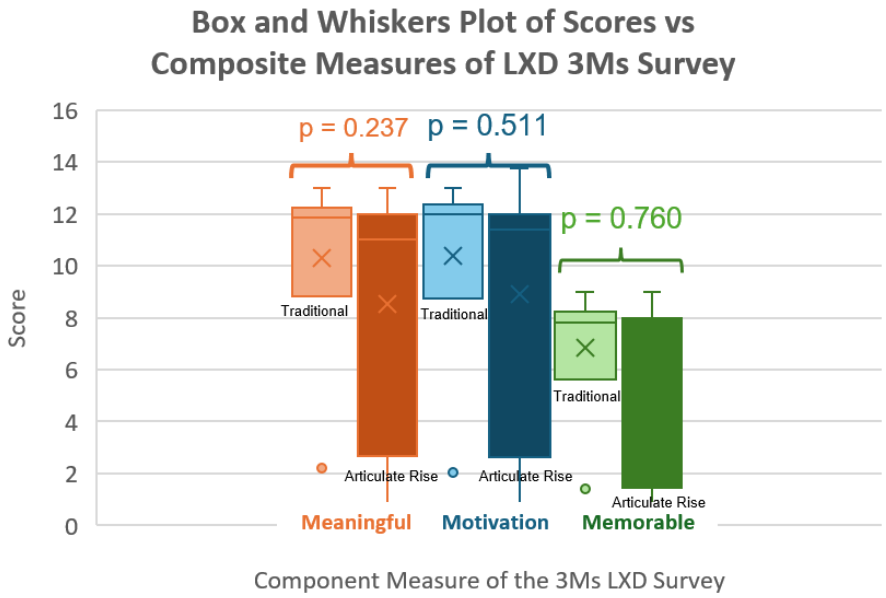

Figure 2: Comparison of learner perceptions across different AOL methods (Traditional, Pre-recorded, and Articulate Rise). The analysis indicates no statistically significant differences in Memorability, Meaningfulness, and Motivation among these learning modalities.

Statistical analyses revealed slight numerical variations and no statistically significant differences in perceived meaningfulness, motivation, and memorability between the two AOL delivery methods (**Figure 2**). Both methods offer instructors asynchronous tools that can be selected based on context, instructional objectives, and available resources, without compromising learner engagement.

Reliability testing, conducted using Cronbach's alpha test, indicated that the "3M Quality Dimensions for Engaging Learning" questionnaire effectively measured learners' experiences. The analysis demonstrated an acceptable level of internal consistency for the memorability dimension ($p = 0.730$), while both motivation ($p = 0.865$) and meaningfulness ($p = 0.876$) exhibited good internal consistency. These findings confirm the robustness and reliability of the questionnaire in assessing the key aspects of learning engagement within the study.

In the component analysis in each of the 3Ms, there were no statistically significant differences in all the quality dimensions, except for "*attention*" (**Table 1**). Notably, learners found in harder to retain attention[S(7)][TT8] in

Articulate Rise (M = 3.71, SD = 1.07, p = 0.043) than traditional, pre-recorded approaches (M = 4.07, SD = 0.75, p = 0.043).

Table 1: Component analysis of the *3M Quality Dimensions for Engaging Learning*, evaluating the eight quality dimensions under "*Memorable*", "*Meaningful*", and "*Motivation*" across the two AOL methods (Traditional, Pre-recorded, versus Articulate Rise).

Sub-Domain	Pre-Survey [Median (IQR)] (n = 81)	Post-Survey [Median (IQR)] (n = 74)	p-value (p = 0.05)
Meaningfulness			
Application	4 ± 0.75	3.97 ± 0.90	0.959
Problem-Solving	4.04 ± 0.75	3.88 ± 0.95	0.309
Collaboration	3.91 ± 0.98	3.58 ± 1.11	0.059
Motivational			
Attention	4.07 ± 0.74	3.71 ± 1.09	**0.043***
Autonomy	4.14 ± 0.76	4.11 ± 0.93	0.864
Confidence	3.95 ± 0.78	4 ± 0.93	0.434
Memorable			
Appreciation	4.12 ± 0.74	4.15 ± 0.74	0.697
Autonomy	3.78 ± 0.89	3.81 ± 0.89	0.877

* *statistical significance ($p < 0.05$)*

Qualitative analysis revealed that this is plausibly attributable to the lengthiness of content, the improper user experience and/or the insufficient of explanation of contents [S(9)][S(10)][S(11)][TT12]. Learners shared that:

"The notes used to accompany the articulate rise is also too wordy, making it hard to find information."

"Lesser in-depth explanation so sometimes can be a bit confusing."

"Not much aside from the fact that if I leave (the Articulate Rise Learning package) halfway (into the lessons), I'll have to redo the content from the start".

Conversely, learners also highlighted that the Articulate Rise learning packages offered flexibility in completing their knowledge acquisition process, enhanced the interactivity between the learning content and the learners, and an improved flow and organisation of learning contents when Articulate Rise is adopted. This offers learners to take control of their learning, allowing them to review materials and adjust their pace based on their individual progress.

"Due to my short attention span, long lectures do cause me to blur out halfway, this results in me not being able to understand most of what the lecturers are talking about. However, with this new AOL, I can engage in interactive activities where I am constantly challenged, and it has given me the motivation to learn and grasp the concepts presented. This method of learning is really suited to my learning needs."

"The Articulate Rise helped to break down each topic into multiple chapters and you can view each of the chapters without having to scroll through to find them. Additionally, Articulate Rise makes things less wordy and more visual, so it is better for me."

Among the key strengths, the enhanced interactivity and the flexibility for self-paced learning align with findings from existing literature (Ang, 2020; Shin et al., 2019). In Ang's (2020) attempt in adopting Articulate Storyline 360 – an interactive learning package – for Diploma in Pharmaceutical Science students, 89% of learners highlighted that the AOL was interactive, engaging and offered flexibility to control their own learning pace. This underscores that interactivity and self-paced learning are highly valued by learners, reinforcing the idea that an effectively designed, flexible and engaging AOLs can enhance the learning experiences.

Macroscopically, the benefits and limitations solicited by learners who participated in the survey returned an ambivalent response, with a balanced mix of advantages and limitations of the Articulate Rise 360 learning package. This might be attributed to the varied learner's characteristics across the cohort of learners. For instance, the perennial concept of "Learning Styles Theory", illustrated in the "VARK model", suggests that individuals learn best when instruction matches their preferred mode of learning — visual, auditory, read and write or kinaesthetic (Fleming, 1995).

Traditional and pre-recorded lectures offer direct auditory and visual explanations to learners (Romanelli

et al., 2009), whereas Articulate Rise 360 learning packages requires hands-on navigation and read-write engagement. The spectrum of learning style preferences varied the interest in the modality of AOL, likely contributing to the finding of this study. It is plausible that the community of learners exhibited a mixed preference for both CPL and Articulate Rise 360, reflecting the diverse ways in which individuals engage with and respond to different instructional approaches.

Hence, deliberate efforts are needed to better accommodate learners' needs by enhancing the integration of audiovisual content while maintaining interactivity. Learners suggested that:

"Maybe try to add everything into the rise as sometime the recorder videos inside have info not mentioned in rise and then get very confused where the info is or where am I know in the lectures."

To accomplish this, educators must continuously refine and enhance content and features through iterative improvements, ensuring a more effective learning experience at the community level.

This study has several limitations. Firstly, this study was designed as an explorative study. Its generalisability is restricted, as the study design compares between different weeks of learning content, which may affect the efficacy of the results. Moreover, the findings are based on a specific learner group. Furthermore, this study focuses on the learners' perception in theoretical learning. The actual impact of AOL on enhancing the attainment of the learning outcome of face-to-face tutorials in a blended learning pedagogy. Lastly, it does not assess long-term knowledge retention or real-world application. However, these findings still provide insights into learner engagement and motivation. While practical applications were not included, the study establishes a foundation for evaluating theoretical learning in digital environments.

Future research should consider broadening participant diversity, integrate practical learning methods such as simulations or case-based exercises, and include follow-up assessments to measure long-term retention and real-world application of knowledge. Future study could also compare AOLs with the same content to understand the differences in perceptions between two modes of AOL. These steps will enhance the understanding of AOL's impact on both theoretical and applied learning, ensuring a more comprehensive evaluation of its effectiveness in blended learning environments.

Conclusions

Articulate Rise, with its improved interactivity and self-paced structure, presents a viable alternative to the traditional pre-recorded lectures used in the flipped classroom approach. However, to maximise its effectiveness, careful attention must be given to maintaining learner engagement. Thoughtfully curated content, clear explanations, and an intuitively designed user interface can significantly enhance the learning experience. Further research is needed to explore its impact on other subjects, knowledge acquisition and skills training.

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