

Pharmacy Students' Evaluation of Pharmaceutical Advertisements: Research Evidence from a 5th year classroom

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Abstract

Background: Pharmaceutical advertisements are powerful patient education sources.

Aim: The aim of this study was to document students' analysis of advertisements, as educational materials.

Method: The study used a mixed method design that yielded both quantitative and qualitative data for assessment.

Results: The results indicated that students were able to (a) apply their interdisciplinary knowledge to analyze the information in pharmaceutical advertisements, (b) function as independent learners by individually identifying themes in pharmaceutical advertisements that targeted consumer behavior and (c) evaluate the claims in advertisements for scientific accuracy.

Conclusion: The results can support the formulation of classroom pedagogies to improve 5th year pharmacy students' capacity to take a more active role in preparing for their future job.

Keywords: college student cognition, knowledge construction, problem-based learning, research-based practice

Aim

Prior surveys found that popular media sources such as television, internet and magazines are the primary sources of scientific knowledge updates for the public (NSF, 2012). Hence, due to the reportedly poor quality of advertisements (Othman *et al.*, 2009; Korenstein *et al.*, 2009), there is a pressing need to prepare pharmacists for advising their patients about advertised claims. Our work set out to develop and evaluate an instructional approach that helps pharmacy students examine common advertisements in preparation for their future jobs. We hypothesized that by the end of intervention pharmacy students' will be able to:

- (1) Apply their interdisciplinary scientific knowledge to analyze health information in pharmaceutical advertisements.
- (2) Function as independent learners by individually identifying key issues in advertisements that are less than correct representations of a product.
- (3) Evaluate patient education materials – such as pharmaceutical advertisements – for scientific accuracy so as to better meet patient needs.

Theoretical Background

Our instructional design-decisions were influenced by prior research on the cognitive, affective and behavioral

components of learning. To consider elements of cognition, our work used the constructivist paradigm that centers on the need for learners to actively integrate new information with their existing knowledge in order to generate new understandings (Glaserfled, 1996; Cunningham & Duffy, 1996).

The second theoretical perspective that influenced our work, and particularly the evaluation of data results, was prior work on the theory of Reasoned Action (TRA) and the related, Theory of Planned Behavior (TPB) (Ajzen & Fishbein, 1973; Armitage & Conner, 2000). The TRA/TPB perspective focuses on three constructs that influence behavioral intention: (a) patients' attitude towards a behavioral choice; (b) the social norms/behaviors of patient's community; as well as (c) patients' perception of their own control for a behavior. We hypothesized that if our approach proves fruitful we will be able to further integrate research results to continued revisions of our instructional design-decisions.

Methods

The 152 participants in this study were mixed gender college students in an inner city, private university located in the United States. While participating in the study, these students were in the second semester of the fifth year of their training. The design of the course integrated traditionally separate topics of instructions such as pharmacology, medicinal

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chemistry, and clinical practice relevant to common medical conditions. Three experienced university professors (one with expertise in each area) taught the curricular content that included nutrition, diabetes, bone disease as well as adrenal-, pituitary-, and thyroid- disorders and reproductive medicine. The majority of instruction was lecture-discussion based with handouts distributed by each professor. This learning environment was enhanced with example knowledge application activities. One such activity was the analysis of student-selected pharmaceutical advertisements and we report of the results of this learning activity here. The first author was an observer during the lectures and the second author was an instructor.

The problem-based learning (PBL) activity placed students in a setting, much like their future work environment (Barrows *et al.*, 1980; Hmelo *et al.*, 2006). First, students selected an advertisement that used the content they learned during the interdisciplinary classroom instruction. Next, students independently searched databases and clinical trials for available data on the advertised pharmaceutical. This step was complex for students as they had to be self-directed in their learning without a previously determined protocol to yield answers. Finally, students applied their prior and newly gained knowledge to analyze their self-selected pharmaceutical advertisements for scientific content. To do so they assessed the nature of specific claims that the advertisement made and evaluated the consistency between the advertised claims and currently available scientific knowledge. The study was approved as by the Institutional Review Board for human subject research at the authors' home institution.

Data Sources and Measures

The main source of data, the measurement instrument of this study, was the worksheet that students used to record their thinking during the problem solving activity. The worksheets asked students to use their developing conceptual knowledge to: (1) scientifically characterize a pharmaceutical product; (2) identify key issues by recording patient motivations for the use of a product along with claims that the advertisements made to influence patient behavior; and (3) evaluate claims made by the advertisements for scientific accuracy.

Using this instrument, students' *conceptual knowledge* was assessed by the teaching professor; the second author of the study. She determined whether students described the selected pharmaceutical with scientific accuracy. She used a grading method she previously established to grade all student assignments in the class.

Students' *recognition of common themes* in advertised claims was coded by three graduate-students, under the supervision of the first author. After individual coding, inter-rater agreement was established by way of repeated discussions between coders and the first author. Coders debated and eliminated discrepancies resulting 100% inter-rater agreement.

To describe students' *evaluation of the scientific quality of claims* that were made by advertisements we used a simple summary of scores yielded by the worksheet. Students assigned a score of one to claims that were entirely incorrect, and a score of five to claims that were judged as correct (or

optimal) for patient education. Figure 1 provides example questions from the worksheets and illustrates the scoring method students used.

Figure 1: Example problems and questions in students' worksheets.

In this unit you learned to assess your scientific knowledge about the mechanisms of action of therapeutics in coordination with various diseases of the endocrine systems. This assignment requires you to practice your newly constructed knowledge in a practical setting, similar to the tasks you will be involved in as a practicing pharmacist. It will help you critically analyze the advertising that goes on in the public arena and help you give informed advice to your patients and/or customers.			
INSERT SCANNED AD HERE (Note: this section could be several pages)			
Disease Targeted:			
Name of Drug:		Generic Name:	Trade Name:
Mechanism of action (be specific):			
How does this drug compare to its prototype? If your drug is a combination of two drugs, then please compare to each drug individually.			
What are the personal characteristics of the customers this advertisement targets? (Hint: age group, gender, personal priorities... etc).			
What may be the various interests (motivations) of these customers to consume (use) the advertised drug?			
Identify each major claim the ad makes and assess if these claims are scientifically correct (based on the drug's mechanism of action you documented in point 1). If you do not find any scientific proof for the claim made in the advertisement say it so in the appropriate column. Rate the match between the claim and the scientific truth as you record your thinking below (you may extend this table).			
CLAIM MADE BY ADVERTISE- MENT	ADVERTISE D EFFECT ON THE LIFE OF PATIENTS	SCIENTIFIC MECHANISM / MODE OF EFFECT	Rate match between the claim and the actual scientific mechanisms
Claim 1:	Effect of claim 1:	Scientific mechanism related to claim 1:	123 4 5 Incorrect Correct
Claim 2:	Effect of claim 2:	Scientific mechanism related to claim 2:	123 4 5 Incorrect Correct
DECEPTIVE CLAIM ADVERTISED		STAKEHOLDER INTERST: PATIENT	STAKEHOLDER INTEREST: OTHER
Claim1			
Claim 2			

Data Analysis

The research design used a concurrent, mixed-method approach (Plano & Cresswell, 2008). It was a *mixed-method* approach as it collected both qualitative and quantitative data and it was a *concurrent* as the combination of the qualitative and quantitative data was systematically designed from the start of the study. Our analysis of students' thinking focused on their ability to: (a) apply accurate conceptual knowledge to analyze pharmaceutical advertisements; (b) independently recognize common claims used by advertisements; and (c) evaluate these claim-statements for accuracy.

Analysis one: application of conceptual knowledge. First, students' conceptual knowledge score was gained from the first few questions the PBL worksheets (Figure 1). These questions asked students to describe the: (1) targeted disease; (2) the various names of the pharmaceutical in question; (3) the mechanism of action; (4) provide a comparison to its prototype; and (5) describe potential adverse effects. Each correct answer received the score of 10 yielding the maximum score of 50. These scores were converted to percent-correct value scores to assign grades to students based on the grading system the second author already established for this course.

Analysis two: recognition of key issues in advertised claims. This analysis considered students' free-flowing, short answers in response to the task to "analyze at least three incorrect /deceptive claims made by the advertisement". This task prompted students to think about the stakeholders and their motivations when determining misleading claims. To quantify these qualitative data results, we used analysis methods that were documented for effectiveness by the prior literature (Chi, 1997; Cook & Campbell, 1979; Denzin & Lincoln, 2005; Miles & Huberman, 1994). First, we entered the claims that students recorded into a database software tool. Next, we categorized the recorded claims into overall themes by allowing the themes to emerge from students' records. Finally, we looked for a match between these emerging themes and the components the TRA/TPB (*i.e.* attitude towards solution, social/norm, and personal control). This comparison allowed us to see whether the components of the TRA/TPB were independently recognized by students in their responses.

Analysis three: students' evaluation of advertised claims. This analysis focused on students' answers to the task: "Identify each major claim the ad makes and assess if these claims are scientifically correct". Students scored each claim for accuracy on a scale of 1 (incorrect) to 5 (correct). We summarized the: (a) number of claims student recorded; (b) the proportion of claims that were assessed as correct as well as; (c) the proportion of claims that were evaluated as incorrect to some degree (claims that received a score less than five). The authors and coders confirmed the overall meaning of claims listed by students but did not validate students' scoring for objective agreement. That is, this analysis was not intended to make generalizations about the quality of scientific advertisements. In contrast, the study aimed to document how students evaluated claims for deviation from scientific correctness.

Results

Application of conceptual knowledge

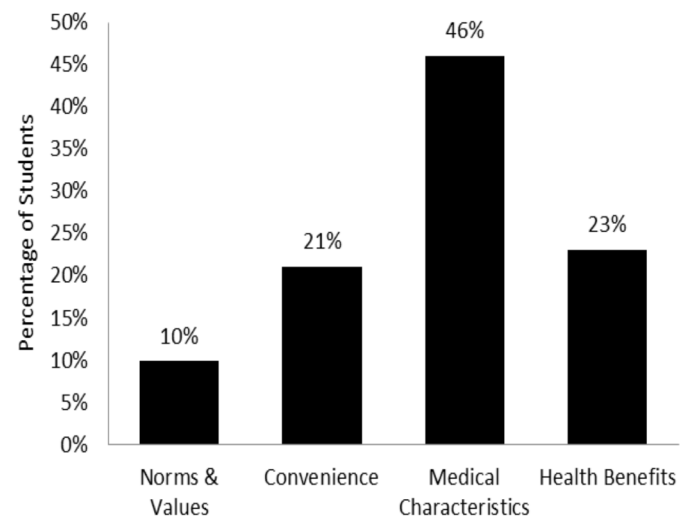
On average, students received 44.2 points (out of a maximum of 50 points) for their ability to use appropriate conceptual knowledge to analyze the pharmaceutical agent being advertised for the following characteristics: targeted disease, names, mechanism of action, prototype comparison and adverse effects. This performance equals to an average of an 88.4% correct score or a B+ grade at the students' university. Overall, students performed better on the PBL assignment as compared to their previous grades.

Recognition of key issues in advertised claims

Students noted four general categories of claims that made them concerned about scientific correctness. First, students noted claims that focused on the beneficial medical effects of the advertised pharmaceuticals as compared to other products. For example, these claims referred to effectiveness in healing or preventing disease, lack of side effects, or presence of US patent. Second, students noted focus on the personal health benefits of the advertised drug. Claims in this category included reference to improved performance as well as the effectiveness of the pharmaceutical and safety. Third, students noted claims that focused on the convenience of using the product including reference to cost, and ease of access/availability. Fourth, students noted claims that focused on consumers' social norms and values. For example, the advertised claims associated the use of the product with drive to be happy, to have a fulfilling life, to stand out in a crowd and be a leader or to comply with the behavior of a larger group.

Of the 152 student participants who responded to this question 46% noted at least one ambiguous claim about the medical characteristics of the advertised drug. Unclear claims about health benefits were noted by 23% of the students and 21% noted claims about convenience that were not fully backed by available data. Consumers' social norms and values as focal factors in advertisements were noted by 10% of the students. Figure 2 illustrates these findings.

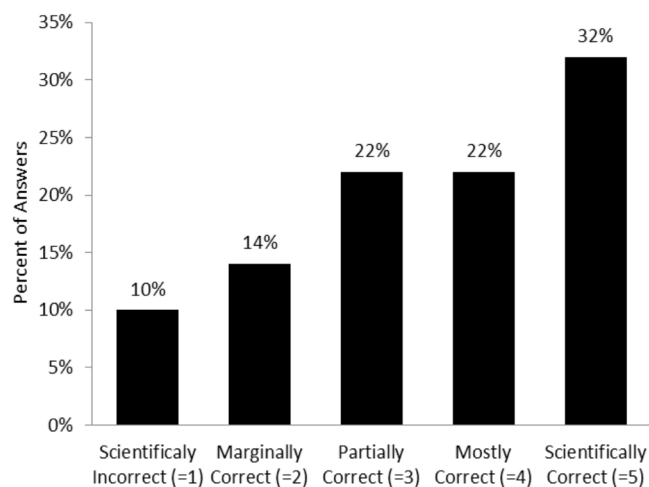
Figure 2: Assessment of themes in pharmaceutical advertisements by 152, 5th year pharmacy students.



Students' evaluations of advertised claims

Students recorded a total of 648 claim analyses in their worksheets. Of these only 206 (32%) claims were scored as scientifically correct by students. The majority of claims students recorded, 442 (68%), received the score of less than the maximum, indicating that students evaluated these claims for at least some deviation from what they considered as scientifically correct. Figure 3 illustrates these findings.

Figure 3: Percentage of 648 claims in pharmaceutical advertisements that 5th year pharmacy students evaluated for different levels of scientific accuracy on a scale of 5 (scientifically correct) to 1 (scientifically incorrect).



Conclusion

The ability to apply scientific knowledge to evaluate educational materials that patients receive is a highly valued competency. The results confirmed our hypothesis that fifth-year pharmacy students' are able to use their newly constructed conceptual knowledge after an integrated endocrinology course to analyze the components of pharmaceutical advertisements. We found that authentic problem solving provided an opportunity for students to actively combine their prior content knowledge with new knowledge that students were then able to readily apply to problem solving.

Additionally, our analysis indicated that students found themes in pharmaceutical advertisements that are known to influence patients' behavioral intentions: attitude, social norm, and control for a behavior. That is, the problem-solving assignment effectively prepared students to recognize inconsistencies between advertised claims and scientific understanding. We argue that the significance of this finding is that students were able to reflect on what they envision as effective communication with patients about pharmaceutical products. The findings highlight the promise of the methodology to train medical professionals, specifically, advanced pharmacy students for their future practice. In the rapidly changing environment of a pharmacist's education and practice, these results are informative and can support the development of alternative teaching strategies to improve 5th year pharmacy students' capacity to take a more active role in preparing for their future job.

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