LONG-TERM EVALUATION OF A SHARED TOBACCO CESSATION CURRICULUM USING A THEORY-BASED APPROACH

by

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Dedicated to my parents

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LIST OF ABBREVIATIONS

OSCE: Objective Structured Clinical Exam

IPPE: Introductory Pharmacy Practice Experiences

APPE: Advanced Pharmacy Practice Experiences

AACP: American Association of Colleges of Pharmacy

NAPLEX: North American Pharmacist Licensure Examination

ABSTRACT

Research indicates that tobacco cessation rates are at least doubled when smokers receive assistance from a clinician; receiving tobacco cessation advice from multiple types of clinicians increases quit rates even further.[1] To address a decades-long deficiency in the tobacco cessation training of health professionals in general, a shared curriculum, Rx for Change: Clinician-Assisted Tobacco Cessation, was developed in 1999 as a collaboration of the schools of pharmacy in California.[2,3] Between 2003 and 2005, pharmacy faculty members (n=191) participated in national train-the-trainer workshops designed to equip faculty with the necessary knowledge and skills to implement the Rx for Change curriculum at their academic institutions.[4]

The studies that comprise this dissertation are a logical extension of this national initiative, applying a mixed-methods approach to: (a) evaluate the long-term impact of training pharmacy faculty using the Rx for Change program, (b) delineate recommendations for developing and disseminating shared curricula for health-care programs, and (c) evaluate utilization of the Rx for Change website, which hosts faculty resources and curricular files for download. In combination, these (along with a previously-conducted qualitative study) provide a comprehensive "view" of the long-term impact of this unique shared curriculum.

Results from the three studies provided evidence for: (1) reach to the majority of pharmacy institutions, (2) a high level of adoption of the Rx for Change in health professional schools, (3) a positive impact on faculty trainees' careers and their level of confidence for teaching, precepting clinical students, and assisting tobacco users, (4) implementation of the Rx for Change curriculum with a variety of teaching methodologies, and (5) continuity of use within the core curriculum of pharmacy institutions. Seven key factors were found to have contributed to the success of the Rx for Change program, and thus the following are recommended for future shared curriculum developers: (1) appeal to attendees, (2) relate content to clinical practice, (3) deliver live training (in-person), (4) develop high quality materials delivered by experts, (5) meet accreditation standards, (6) provide support for teaching, and (7) demonstrate effectiveness. Data from the website analysis provided evidence for interprofessional reach of the Rx for Change website to educators, learners, and professionals.

CHAPTER 1. BACKGROUND AND INTRODUCTION

More than 50 years of research and public health efforts have substantially reduced the prevalence of tobacco use.[5] However, the prevalence of tobacco use remains unacceptably high,[6] with a deaths attributable to tobacco use exceeding 480,000 individuals annually. Worldwide, it is the leading known preventable cause of morbidity and mortality.[5] Additionally, more than $170 billion in healthcare expenditures annually is directly attributable to cigarette smoking.[7] Strong evidence supports that quitting tobacco use benefits health, saves lives, and substantially reduces morbidity and mortality.[8,9] The good news is that two thirds of tobacco users would like to quit, and approximately half report having made a quit attempt in the past year.[6] However, only 7.4% smokers successfully quit on their own.[6] Decades of research indicate that tobacco cessation rates are at least doubled when tobacco users receive assistance from a health professional.[1,10] Due to their availability, expertise in medications, and trust among patients, pharmacists are uniquely positioned to provide tobacco cessation services.[11,12] However, historically health professional schools—including but not limited to pharmacy—have provided inadequate levels of tobacco education for students.[13-25] Additionally, cessation products and professional counseling assistance are underutilized.[26-31]

To close the decades-long gap in tobacco cessation education in pharmacy schools, a small group of pharmacy faculty in California developed the shared *Rx for Change: Clinician-Assisted Tobacco Cessation* curriculum.[2-4,32,33] The Rx for Change curricular materials were developed in 1999 and pilot-tested extensively in California pharmacy schools prior to nationwide dissemination.[32] With funding from the National Cancer Institute, a series of five intensive in-person workshops were subsequently conducted between 2003 and 2005. The training was delivered via a train-the-trainer model, recruiting one to two faculty members from each pharmacy school across the United States and Puerto Rico. A total of 191 faculty members participated in the training, representing 98% of the existing 91 schools of pharmacy at the time.[4] Follow-up surveys of participating faculty estimated that 86% of schools implemented the Rx for Change program at their institution during the following academic year. More than a decade later (in 2016), in response to a request by the Centers for Disease Control and Prevention, a national survey was conducted by the American Association of Colleges of Pharmacy. The survey estimated that 73.5% of the current 135 schools were utilizing all or parts of the Rx for Change program to teach tobacco

cessation to their students.[34] As a first step toward understanding factors underlying the long-term sustainability of the Rx for Change program in pharmacy schools, in 2017, a qualitative study of 18 trained faculty participants was conducted to describe their: (a) perceptions of the train-the-trainer workshop, and (b) subsequent experiences with curricular implementation.[35] A semi-structured guide was used to collect data. These data were analyzed and reported using Kirkpatrick's four levels for effective evaluation as the theoretical framework.[36] These results provided initial evidence characterizing key factors associated with long-term sustainability of the shared curriculum in pharmacy schools, and the interview results informed further work that comprises this dissertation.

Through a series of three independent investigations, this dissertation aims to quantify the long-term impact of this nationwide initiative. To my knowledge, this type of long-term evaluation has not been conducted previously for any educational program within health professional curricula. As summarized below, three objectives comprise the dissertation. The methodology for each study is described in greater detail in Chapters 2, 3, and 4. The importance of and need for this research is grounded in the fact that historically few educational innovations have been developed and disseminated throughout health professional schools, and even fewer have been evaluated for their long-term effects. Experts recommend the development and evaluation of faculty training programs and posit that if these programs are of high quality, they can yield a positive and effective culture of change that moves the profession forward.[37] In combination, the three studies described here (along with the previously-conducted qualitative study) provide a comprehensive "view" of the long-term effects of a truly unique, shared curriculum that has broad applicability across all health disciplines and has been in existence for more than two decades.

1.1 Study #1: Long-Term Evaluation of a Train-the-Trainer Workshop for Pharmacy Faculty Using the RE-AIM Framework

Results of the qualitative study conducted in 2017-2018[35] informed the development of a web-based survey that was distributed to the cohort of trained pharmacy faculty to characterize the impact of the training on the adoption, implementation, and sustainability of the *Rx for Change* curriculum. In this study, the RE-AIM framework was used to estimate the impact of Rx for Change train-the-trainer program on: (1) Reaching pharmacy schools; (2) Effectiveness on faculty confidence, their students confidence, and tobacco cessation related practices; (3) Adoption of the

curriculum as a source for teaching in health professional schools; (4) Implementation of the curriculum in pharmacy schools and challenges faced during implementation; and (5) Maintenance of using the curriculum in the long-term.[38]

1.2 Study #2: Recommendations for Developing and Disseminating Shared Curricula in Pharmacy Education

Prior research indicates that effective faculty training programs for health professional schools can be measured by high adoption rates, long-term sustainability, and high motivation of faculty to attend the training program.[36] In 2017, when we interviewed pharmacy faculty trainees who attended an Rx for Change train-the-trainer workshop,[35] the first interviewee stated, *"I'm not sure what that special ingredient is that makes some of these [workshops] work really well and some of them not."* This comment inspired us to delve into the data from both phases of the research to investigate why the Rx for Change workshops were successful and what can others learn from this experience. Shared curricula, available at no cost to pharmacy educators, have been developed for other important health care topics such as pharmacogenomics,[39] cultural competence,[40] and infectious diseases.[41] However, only Rx for Change has been in existence and continually updated for two decades.

This mixed-methods study aimed to provide valuable information on factors that contributed to the long-term success of the Rx for Change program. This information is useful for educators who plan to develop new shared curricula on other key public health topics, such as obesity and opioid use. The purpose of the study was to synthesize data from prior studies and delineate recommendations guiding the future development of shared curricula in pharmacy education. In this study, Rogers' Diffusion of Innovations Theory[42] was applied as a guiding framework for characteristics of Rx for Change that were associated with curriculum adoption at the U.S. schools of pharmacy.

1.3 Study #3: Longitudinal Analysis of Website Utilization for an Interprofessional Shared Tobacco Cessation Curriculum

The objective of this third study was to characterize use of the Rx for Change website as a function of number and types of users (user characteristics), number of sessions (web-site log-in frequency), number of curricular file downloads, and the most commonly accessed teaching tools.

The utilization dataset is unique, and its characterization adds important information to the literature regarding how health professional educators, clinicians, and students utilize a website that is designed specifically to host educational materials for teaching tobacco cessation. This project required analysis of large datasets from the Rx for Change website, including 15,576 users, representing all 50 states and 94 countries, and a total of 259,835 file downloads since launch of the website in April 2004.

CHAPTER 2. STUDY ONE

Although two thirds of tobacco users express interest in quitting, few pharmacists address tobacco use as part of routine practice. Historically, pharmacy schools provided inadequate tobacco cessation training for students. To address this educational gap, train-the-trainer workshops were conducted between 2003 and 2005 to train pharmacy faculty (n=191) to teach a shared, national tobacco cessation curriculum (Rx for Change: Clinician-Assisted Tobacco Cessation) at their academic institutions.

The objective was to characterize the long-term reach, effectiveness, adoption, implementation, and maintenance (RE-AIM) of the shared curriculum at US pharmacy schools.

This study is the second phase of a sequential mixed methods study. Results from Phase 1, a qualitative study, informed the development of survey items for Phase 2. Applying the RE-AIM framework, a web-based survey was developed and administered to train-the-trainer participants.

Of 191 trainees, 186 were eligible to participate and 137 were locatable; of these, 111 completed a survey (81.0%). Most (n=87; 78.4%) reported current employment in academia. The most highly rated reason for attending the workshop was to improve teaching of tobacco cessation content, and 98.1% reported moderate or high confidence for teaching tobacco cessation. Most perceived the Rx for Change training to be either very or extremely impactful on their students' competency (81.3%) and confidence (73.6%) for tobacco cessation counseling and for readiness to apply their knowledge in practice (78.1%). Just over three fourths of faculty respondents who work in academia believe that shared curricula should be more broadly considered for use in pharmacy schools, and 79% agreed that shared curricula are a cost-effective approach to teaching.

Evidence is provided for long-term reach, effectiveness, adoption, implementation, and maintenance of the Rx for Change program. Participants perceived that the workshop resulted in long-term, positive effects on their careers as well as their teaching and clinical practice.

2.1 Introduction

Although the prevalence of tobacco use has decreased significantly over the past 50 years, in 2018 the U.S. Centers for Disease Control and Prevention reported that 13.7% of U.S. adults currently smoked cigarettes either every day or some days.[43] While two thirds of smokers are

interested in quitting, and a little over half report having attempted to quit in the past year, fewer than 10% are successful.[30] This is not surprising, given that proven methods for quitting are markedly underutilized—it is estimated that only 19.6% use a medication, 3.8% attend a cessation class or a program, 2.7% receive one-on-one counseling, and 2.6% call the telephone quitline.[31] Furthermore, although advice from health professionals to quit smoking has increased since 2000, 42.8% of adult cigarette smokers who saw a health professional during the past year reported not receiving advice to quit.[30] This is unfortunate, because assistance from a health professional at least doubles the odds of successfully quitting, and quit rates are increased even further if a medication is used as part of the quitting plan.[1,8] As a result, it is important for health professionals to ask all patients about tobacco use and, at a minimum, strongly advise tobacco users to quit and use evidence-based strategies as part of their quitting plan.[1,8]

To prepare health professionals for this important responsibility, a shared tobacco cessation curriculum, Rx for Change: Clinician-Assisted Tobacco Cessation (https://rxforchange.ucsf.edu),[3] was developed in 1999[2] and has been disseminated widely for more than two decades. Originally designed for pharmacy students, but over time adapted for other health professionals (students and licensed practitioners), the program adheres to the principles set forth in the U.S. Public Health Service Clinical Practice Guideline for Treating Tobacco Use and Dependence[1] and serves as a vehicle for nationwide dissemination of guideline principles. As of March 2019, 15,576 users representing all 50 US states and 94 countries globally were registered users on the Rx for Change web-site.[44] Based on early success of the program within pharmacy schools in California,[2,32] and as a direct result of an identified need to expand the tobacco cessation expertise of pharmacists in general,[17] a plan was set in motion to disseminate the Rx for Change program to schools of pharmacy across the US. To prepare pharmacy faculty members to successfully implement the curricular content at their respective institutions, funding from the National Cancer Institute supported five 2.5-day train-the-trainer workshops in 2003 (n=3), 2004 (n=1), and 2005 (n=1).[4] A total of 191 faculty members participated in a workshop, representing 89 of 91 existing schools of pharmacy at the time (98%). High levels of anticipated adoption of the curriculum were reported immediately following the training—68.3% reported a high likelihood of implementing Rx for Change in the upcoming year,[4] and in 2016 (more than a decade later) a national survey that was commissioned by the Centers for Disease Control and Prevention conducted by the American

Association of Colleges of Pharmacy estimated that 73.5% of 135 pharmacy schools nationwide were integrating Rx for Change materials into their Doctor of Pharmacy curriculum.[34]

Assessing both the short- and long-term impact of a faculty development program after the implementation is important, yet very few program developers do so.[45] Given the unique nature of the Rx for Change shared curriculum, its associated longevity of use, and the programmatic use of federal funds to support its dissemination, an evaluation of the long-term impact of the train-the-trainer approach to dissemination is of scientific interest. To complement data reported by the American Association of Colleges of Pharmacy[34] and to assess the long-term impact of the train-the-trainer program, in 2019-2020 a web-based survey was administered to all pharmacy faculty members who attended an Rx for Change train-the-trainer workshop. Applying the RE-AIM framework,[38] the survey was designed to characterize the reach, effectiveness, adoption, implementation, and maintenance of use of the Rx for Change curriculum, as well as the impact of the program on the faculty attendees' tobacco-related activities in the realms of teaching, practice, and research.

2.2 Methods

This study is the second phase of a two-phase mixed methods, sequential exploratory research project. In phase 1, a randomly-selected subset of 18 pharmacy faculty trainees were interviewed by telephone to explore their perceptions of the Rx for Change program, the train-the-trainer workshop that they attended, and their subsequent experiences with program implementation. These qualitative data,[35] informed the development of this phase 2 quantitative survey for administration to the entire cohort of pharmacy faculty members who attended a train-the-trainer workshop.

The survey builds upon phase 1 findings and applied the RE-AIM framework[38] to estimate the impact of the train-the-trainer workshops with respect to its: (a) Reach to pharmacy schools across the United States, (b) Effectiveness on faculty confidence, their students' confidence, and tobacco cessation-related practices, (c) Adoption of the curriculum as a resource for teaching tobacco cessation in pharmacy schools, (d) Implementation of the curriculum in pharmacy schools and challenges faced during implementation, and (e) Maintenance of the adoption of the curriculum in the long-term.

2.2.1 Study participants

Pharmacy faculty members who attended an Rx for Change train-the-trainer workshop in 2003, 2004, or 2005 were targeted for completion of the study survey. Because 15 years had elapsed between the train-the-trainer programs and administration of the survey in 2019, extensive internet searches were required to locate individuals. This included searching web-pages of their initial academic institutions (at the time of the train-the-trainer workshops), use of broader internet search engines such as Google, and accessing the membership list of professional associations (i.e., American Association of Colleges of Pharmacy, American College of Clinical Pharmacy, American Pharmacists Association). When e-mails bounced back as undeliverable, and no further information was found on the internet, a contact attempt was made through LinkedIn (if an account was identified). If no response was obtained, or if no LinkedIn account was identified, the individual was then classified as unreachable.

Of 191 original faculty members,[4] two participants were excluded because they were involved in the development of the Rx for Change program, and three were deceased. Of the remaining 186 faculty members, what was perceived by the team to be a valid e-mail address was identified for 137 (73.7%). For 49 potential participants (26.3%), an active e-mail address could not be identified (all contact attempts were unsuccessful).

2.2.2 Study measures

Survey items were developed based on findings from phase 1,[35] and were mapped to the RE-AIM elements.[38] Some measures were selected from a survey that was used previously to evaluate the Rx for Change train-the-trainer workshops.[4] Response options for each of the items are described below; for most items, a "not applicable" or "do not recall" option was included, and these responses were removed from the denominator, as appropriate. The complete survey is shown in the Appendix.

2.2.2.1 Demographics

Participants were asked to indicate their current career status: employment in a pharmacy school, non-pharmacy school, practice site where care is provided to patients, retired (not providing care to patients), or other position (not providing care to patients). These selections were

not mutually exclusive. Additionally, if in academia, respondents provided their academic rank and whether they currently held an administrative position.

2.2.2.2 Reach

All participants were asked to rate the importance of eight reasons, derived from our prior qualitative study,[35] that potentially influenced their decision to attend an Rx for Change train-the-trainer workshop (1=not at all important, 2=a little important, 3=moderately important, 4=very important, 5=extremely important). Participants working in academia also were asked whether they currently teach smoking cessation content at their institution and to indicate the extent to which the Rx for Change curriculum is used at their institution (all of it or almost all of it, most of it, some of it, or none).

2.2.2.3 Effectiveness

Survey items assessed the perceived degree to which participation in the Rx for Change workshop impacted their career (not at all, a little, moderately, very, or extremely impactful). Participants' current confidence (none, low, moderate, or high) was assessed for teaching tobacco cessation content, precepting Introductory/Advanced Pharmacy Practice Experience (IPPE/APPE) students for tobacco cessation activities, and providing tobacco cessation counseling to patients. Faculty were also asked to rate the extent to which receiving Rx for Change education (as part of coursework) impacted their students' competency and confidence for providing tobacco cessation counseling and their students' readiness to apply their knowledge in practice (not at all, a little, moderately, very, or extremely impactful). Those currently working in a clinical setting reported how often they ask their patients about tobacco use and which approaches are used when assisting patients with quitting.

2.2.2.4 Adoption

Using a 4-point scale (1=none, 2=low, 3=moderate, 4=high), participants rated five characteristics of the Rx for Change program, which are described by Everett Rogers' Diffusion of Innovations Theory to be associated with adoption of new programs:[42] comprehensiveness of content, appropriateness of teaching methodologies used, simplicity of implementing Rx for

Change, compatibility for integration into existing curriculum structures, and relative advantage over other tobacco cessation content that is available elsewhere or developed internally. Additionally, participants were asked to identify tobacco-related enhancement activities (e.g., new initiatives) with which they had been personally involved since their workshop attendance and whether they were interested in receiving information regarding access of newly-developed tobacco-specific virtual patients and standardized patient/Objective Structured Clinical Examination (OSCE) cases.

Usefulness of the Rx for Change website for supporting teaching of tobacco cessation was rated as not at all, a little, moderately, very, or extremely useful. Finally, participants were asked whether they perceive shared curricula, in general, to be a cost-effective approach to teaching, whether shared curricula should be more broadly considered for use in pharmacy schools, and whether they had advised other pharmacy faculty members and/or non-pharmacy faculty members to consider adopting Rx for Change at their institution.

2.2.2.5 Implementation

Participants identified approaches that they have used for teaching tobacco cessation and rated challenging aspects associated with implementing (or attempting to implement) the Rx for Change program (not at all, a little, moderately, very, or extremely challenging). For one of the challenges, i.e., limited time in the curriculum, participants who selected a little, moderately, very, or extremely challenging were asked to indicate how they overcame this challenge. Participants also indicated the number of hours of tobacco cessation currently integrated into their institutions' required Doctor of Pharmacy curriculum (1 to <4 hours, 4 to <6 hours, 6 to <8 hours, 8 to <10 hours, 10 or more hours).

2.2.2.6 Maintenance

For participants currently working in academia, the likelihood that Rx for Change content would be used to teach tobacco cessation during the next academic year was assessed (not at all, a little, moderately, very likely, or extremely likely). As a proxy measure for ongoing maintenance of implementation of the Rx for Change curriculum, the survey assessed the frequency by which participants log into the Rx for change website (never, less than once a year, about once a year,

about 2 to 10 times a year, more than 10 times a year, I have used the website in the past, but no longer do because I do not currently teach Rx for Change).

To enhance further dissemination of Rx for Change to schools of pharmacy, respondents were asked to rate their perceptions of the effectiveness of four strategies: (a) provide enduring on-demand web-based train-the-trainer programs that can be accessed at any time, (b) conduct a 1-day session before an American Association of Colleges of Pharmacy (AACP) or other professional meeting, (c) conduct more live, on-site train-the-trainer workshops, similar to the San Francisco workshops, and (d) conduct "live" web-based trainings or webinars. Response options were 1=not at all, 2=a little, 3=moderately, 4=very, and 5=extremely effective.

2.2.2.7 Further advancement of the role of pharmacy in tobacco cessation

Respondents rated their perceived importance of seven potential actions for advancing the role of pharmacy in tobacco cessation (1=not at all, 2=a little, 3=moderately, 4=very, 5=extremely). Specific actions assessed were: (a) include tobacco content in the core curriculum of all pharmacy schools, (b) include tobacco-related questions on state board licensing examinations, (c) have students apply tobacco cessation counseling skills during IPPE/APPE rotations, (d) provide a web-based "booster" training for students to complete, prior to APPE, (e) provide a train-the-trainer program for faculty with free CE (live or online), (f) partner with State Departments of Health, and (g) partner with tobacco quitlines.

2.2.3 Survey administration and analysis

Web-based surveys were administered using Qualtrics. An introductory e-mail described the purpose of the research and provided a consent document and link to the survey. Two reminder notices were sent to non-responders. Because university servers commonly filter surveys that are distributed via Qualtrics, a final contact was made from the investigators' (KH or RC) email address. The full survey required approximately 15 minutes to complete in its entirety, although skip patterns were embedded that rendered a briefer survey for most participants. A $20 Amazon.com gift card was provided to study participants.

Data were analyzed using SPSS software, version 26.[46] Descriptive statistics were computed to characterize the study population and their survey responses. Unless otherwise indicated,

denominators for computed percentages included only those individuals for whom the question was displayed. Approval to conduct the study was obtained from the Purdue University Human Research Protection Program.

2.3 Results

2.3.1 Study participants

Of 137 faculty members for whom a viable email address was identified, 111 (81.0%) completed the survey (59.7% of the eligible cohort; Figure 1). These respondents represented 75 (84.3%) of the 89 schools or colleges of pharmacy that participated in a train-the-trainer workshop.[4] Of the 111 respondents, 87 (78.4%) reported a current employment position in academia (of whom 27 were clinical faculty), and 34 (30.6%) currently practiced in a clinical setting (responses not mutually exclusive). Others had either retired (n=7; 6.3%) or work in a non-academic, non-clinical setting (n=10; 9.0%). Within academia, 41 respondents were full professors, 25 were associate professors, and 5 were assistant professors. Fourteen were the Chair or Head of a department, 20 were an Assistant or Associate Dean, and 2 were a Dean.

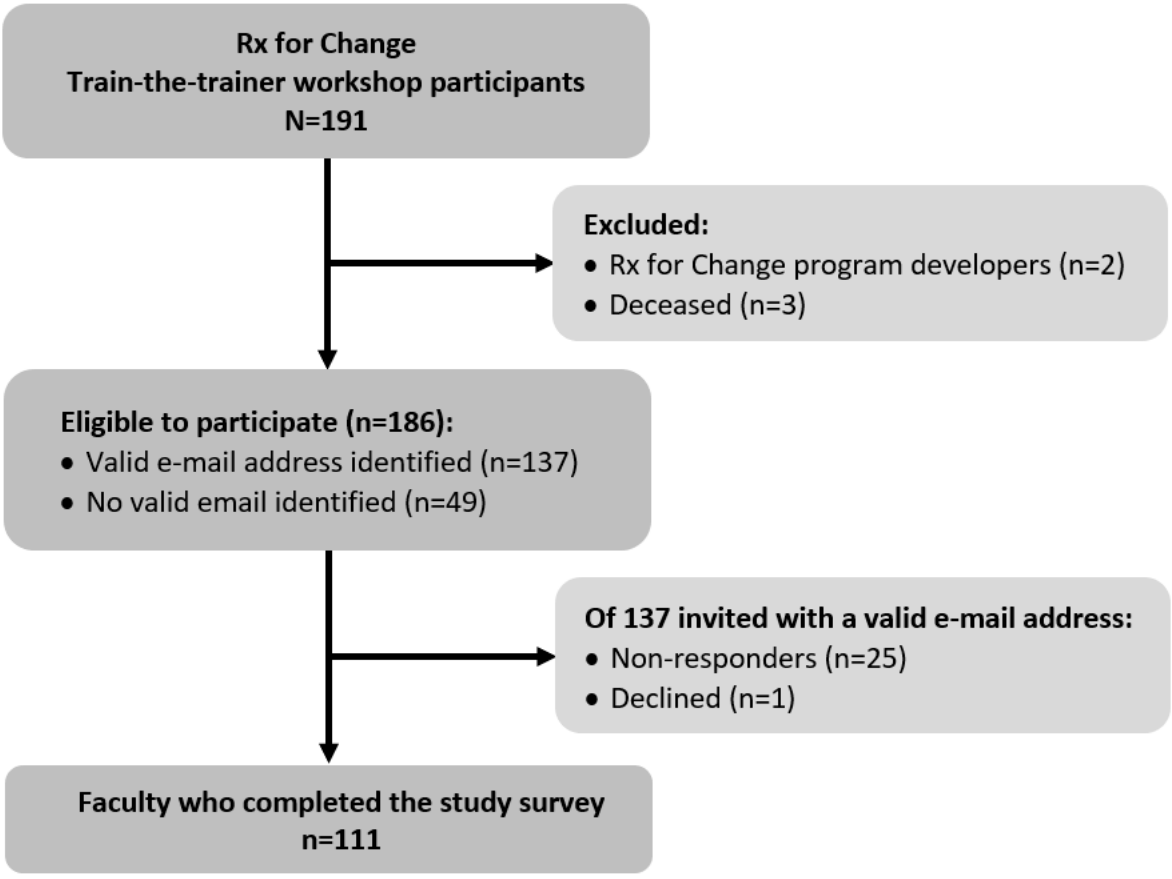

Figure 1. Study population and participation flow chart.

2.3.2 Reach

Among all 111 respondents, the most important reason for attending an Rx for Change train-the-trainer workshop was to improve teaching of tobacco cessation content, which was rated as very or extremely important by 86.2% (Table 1), and 32.2% of respondents reported currently teaching tobacco cessation (n=28 of 87 in academia). Most respondents' academic institutions were either utilizing some (n=32 of 65; 49.2%) or most/all (n=26; 40.0%) of the Rx for Change materials for tobacco cessation curricular content (22 reported not knowing this information).

Table 1. Reasons that influenced faculty members' decision to attend an Rx for Change workshop between 2003 and 2005 (n=111).[a]

Reasons (respondents)	Rating[b] [n, (%)]					
	Not at all important (1)	A little important (2)	Moderately important (3)	Very important (4)	Extremely important (5)	Average rating
To improve my teaching for tobacco cessation (n=109)	1 (0.9)	4 (3.7)	10 (9.2)	35 (32.1)	59 (54.1)	4.3
To improve my skills for treating tobacco use and dependence (n=109)	3 (2.8)	8 (7.3)	13 (11.9)	27 (24.8)	58 (53.2)	4.2
To improve the tobacco content in our curriculum (n=108)	2 (1.9)	4 (3.7)	17 (15.7)	31 (28.7)	54 (50.0)	4.2
To be a part of this national training initiative (n=110)	5 (4.5)	16 (14.5)	26 (23.6)	28 (25.5)	35 (31.8)	3.7
An opportunity to meet colleagues with similar interests (n=106)	10 (9.4)	18 (17.0)	22 (20.8)	34 (32.1)	22 (20.8)	3.4
It was encouraged by a mentor or colleague (n=99)	20 (20.2)	9 (9.1)	23 (23.2)	26 (26.3)	21 (21.2)	3.2
It was required or encouraged by my university administration (n=105)	32 (30.5)	16 (15.2)	13 (12.4)	25 (23.8)	19 (18.1)	2.8
An opportunity to travel to San Francisco at no cost (n=109)	45 (41.3)	30 (27.5)	15 (13.8)	11 (10.1)	8 (7.3)	2.1

[a] "I do not recall" and missing responses were removed from the denominator; < 6% for all items, except "It was encouraged by a mentor or colleague," which was 10.8%. [b] Item wording: "How important were each of the following in your decision to attend an Rx for Change train-the-trainer workshop between 2003 and 2005?"

2.3.3 Effectiveness

When asked to rate the extent to which attending the train-the-trainer workshop impacted participants' career, 12.6% reported it was extremely impactful, 32.4% very impactful, 33.3% moderately impactful, 18.9% a little impactful, and 2.7% not at all impactful. Nearly all participants (98.1%) reported a moderate or high level of confidence for teaching tobacco cessation, and 96.8% reported moderate or high confidence for precepting IPPE/APPE students for tobacco cessation activities. Ninety-seven percent reported moderate or high confidence for providing tobacco cessation counseling to patients. Most respondents perceived the Rx for Change training to be either very or extremely impactful on their students' competency (81.3%) and confidence (73.6%) for tobacco cessation counseling, and for their readiness to apply their knowledge in practice (78.1%).

Among participants who were currently providing patient care (n=34), most reported asking their patients about tobacco use all or almost all the time (70.6%) or at least half of the time (5.9%). Most respondents indicated that they apply motivational interviewing techniques when discussing tobacco cessation with patients (76.5%), integrate brief counseling into practice (Ask-Advise-Refer; 70.6%), integrate comprehensive counseling using the 5 A's (Ask, Advise, Assess, Assist, Arrange; 67.6%), and address the 5 R's for those not ready to quit (Relevance, Risks, Rewards, Roadblocks, Repetition; 61.8%). Half of the respondents provide tobacco quitline cards/telephone number (50.0%), and 41.2% check for potential smoking-drug interactions when filling prescriptions.

2.3.4 Adoption

Respondents' ratings for characteristics of the Rx for Change program are reported in Table 2; all four characteristics were rated at least 3.6 on a 4-point scale (1 to 4), with comprehensiveness of the content rated highest. As shown in the upper half of Table 3, respondents have been engaged in a variety of tobacco-related enhancement activities since their participation in a train-the-trainer workshop. Among participants who work in academia, 67 (77.9%) said they were interested in learning more about newly-developed tobacco-specific virtual patients and standardized patient/OSCE cases.

Table 2. Faculty ratings of characteristics of the Rx for Change curriculum, derived from Rogers' Diffusion of Innovations Theory16 (n=111).[a]

Characteristics (respondents)	Rating[b] [n, (%)]				
	None (1)	Low (2)	Moderate (3)	High (4)	Average rating
Comprehensiveness of content (n=111)	0 (0.0)	0 (0.0)	11 (9.9)	100 (90.1)	3.9
Appropriateness of teaching methodologies used (n=109)	0 (0.0)	3 (2.8)	18 (16.5)	88 (80.7)	3.8
Simplicity of implementing Rx for Change (n=108)	0 (0.0)	3 (2.8)	25 (23.1)	80 (74.1)	3.7
Compatibility for integration into your existing curriculum structure (n=104)	0 (0.0)	5 (4.8)	25 (24.0)	74 (71.2)	3.7
Relative advantage over other tobacco cessation content that is available elsewhere or developed internally at your school of pharmacy (n=92)	3 (3.3)	3 (3.3)	21 (22.8)	65 (70.7)	3.6

[a] "I do not recall" and missing responses were removed from the denominator; < 7%, with the exception of "relative advantage" item, which was 17.1%.

[b] Item wording: "Please rate each of the following characteristics of the Rx for Change curriculum."

Table 3. Tobacco-related activities and teaching approaches (n=111).

Tobacco-related enhancement activities[a]	**n (%)**
Increased the number of hours of tobacco cessation content that pharmacy students receive in the core curriculum	71 (64.0)
Added a new tobacco-related skills/practice laboratory activity	65 (58.6)
Conducted a research project related to tobacco	27 (24.3)
Implemented standardized patients for students to counsel for practice (i.e., not high stakes)	22 (19.8)
Implemented a tobacco-specific objective structured clinical examination (OSCE) to formally evaluate students	13 (11.7)
Developed a tobacco cessation elective	11 (9.9)
Developed an inter-professional activity focused on tobacco	7 (6.3)
Tobacco cessation teaching approaches[b] (inside and outside of classroom)	**n (%)**
Taught tobacco lectures in the classroom	96 (86.5)
Taught pharmacy practice laboratories/workshops for students (e.g. role playing with case studies, hands on use of medications for cessation)	84 (75.7)
Served as an IPPE or APPE preceptor for students in a clinical setting where patients receive tobacco cessation counseling	73 (65.8)
Taught continuing education programs	40 (36.0)
Facilitated group tobacco cessation programs for patients	27 (24.3)
Created web-based lectures/podcasts for students to view prior to classroom instruction (e.g., flipped classroom technique)	9 (8.1)

[a] Item wording: Since participation in an Rx for Change train-the-trainer workshop (in 2003-2005), with which of the following have you been involved? (Select all that apply)

[b] Item wording: In your history of teaching tobacco cessation (in any institution where you have worked), which of the following approaches have you used? (Select all that apply)

Abbreviations: OSCE, Objective Structured Clinical Exam; IPPE, Introductory Pharmacy Practice Experiences; APPE, Advanced Pharmacy Practice Experiences.

The majority of respondents rated the usefulness of the Rx for Change website for supporting teaching of tobacco cessation as either very (40.5%) or extremely useful (49.4%). Most (79%) of those who work in academia believe that shared curricula are a cost-effective approach to teaching, 17.4% were neutral, and 3.5% disagreed; 77.9% agreed that shared curricula should be more broadly considered for use in pharmacy schools. Since participating in the workshop, 73.0% of 111 participants had advised other pharmacy faculty members to consider adopting Rx for Change at their institution, and 26.1% had advised non-pharmacy faculty at other health professional schools.

2.3.5 Implementation

When participants implemented the curricular materials, the most common approach for teaching was lecture format (86.5%), followed by pharmacy practice laboratories/workshops for students (75.7%) (bottom half of Table 3). Limited time in the curriculum was the most challenging aspect associated with implementation, with faculty rating it as extremely (14.0%), very (26.2%), moderately (28.0%), a little (22.4), or not at all challenging (9.3%). Of those who perceived limited time in the curriculum as being a challenge (n=97), 76.3% reported prioritizing specific content to fit the number of hours that were allowed. Other methods were also used to address the limited time in the curriculum: assigned content/materials for students to read or review outside of class (26.8%), gradually increased time dedicated to tobacco in the curriculum over the years (21.6%), asked the curriculum committee to allow for additional curricular time (12.4%), and developed an elective course for tobacco cessation to cover more material (12.4%); options were not mutually exclusive. At the time of survey, 24 of those who worked in academia were uncertain how many hours of tobacco cessation content were currently being taught; among others, 77.8% of respondents' institutions taught less than six hours of tobacco cessation content in their Doctor of Pharmacy core curriculum; 22.2% taught the recommended minimum of six hours.[47]

2.3.6 Maintenance and further dissemination of the Rx for Change program

Among respondents with current employment in academia, 61.3% indicated it is very or extremely likely that the Rx for Change curriculum will be used to teach tobacco cessation during the next academic year at their institution (2019-2020; n=24 who reported "I do not know" were

excluded from the analysis). Of all respondents, 32.4% reported accessing the website annually, and of those who teach tobacco cessation (n=28), 78.8% access the website at least annually. Respondents' perceptions of the effectiveness of four strategies to further disseminate the Rx for Change program are shown in Table 4.

2.3.7 Further advancement of the role of pharmacy in tobacco cessation

Table 5 provides faculty perceptions of strategies for further advancing the role of pharmacy in tobacco cessation. The three most highly rated strategies were (1) including tobacco content in the core curriculum of all pharmacy schools, (2) having students apply tobacco cessation counseling skills as part of experiential education, and (3) including tobacco-related questions on the pharmacy licensure examination.

Table 4. Faculty perceptions of strategies to further disseminate the Rx for Change program to colleges/schools of pharmacy (n=111).[a]

Strategy (respondents)	Rating[b] [n, (%)]					
	Not at all effective (1)	**A little effective (2)**	**Moderately effective (3)**	**Very effective (4)**	**Extremely effective (5)**	**Average rating**
Provide enduring on-demand web-based train-the-trainer programs that can be accessed at any time (n=110)	1 (0.9)	10 (9.1)	18 (16.4)	45 (40.9)	36 (32.7)	4.0
Conduct a 1-day session before an AACP or other professional meeting (n=110)	3 (2.7)	8 (7.3)	19 (17.3)	46 (41.8)	34 (30.9)	3.9
Conduct more live, on-site train-the-trainer workshops, similar to the San Francisco workshops (n=110)	2 (1.8)	8 (7.3)	26 (23.6)	47 (42.7)	27 (24.5)	3.8
Conduct "live" web-based trainings or webinars (n=109)	0 (0.0)	9 (8.3)	29 (26.6)	47 (43.1)	24 (22.0)	3.8

[a] "No opinion" responses were removed from the denominator (<2%).

[b] Item wording: "In your opinion, how effective would the following strategies be in further disseminating Rx for Change to the newer colleges/schools of pharmacy?"

Abbreviation: AACP, American Association of Colleges of Pharmacy.

Table 5. Faculty members' perceptions of potential methods for further advancing the role of pharmacy in tobacco cessation (n=111).[a]

Methods (respondents)	Rating[b] [n, (%)]					
	Not at all important (1)	A little important (2)	Moderately important (3)	Very important (4)	Extremely important (5)	Average rating
Include tobacco content in the core curriculum of all pharmacy schools (n=110)	0 (0.0)	2 (1.8)	2 (1.8)	25 (22.7)	81 (73.6)	4.7
Have students apply tobacco cessation counseling skills during IPPE/APPE rotations (n=111)	0 (0.0)	1 (0.9)	3 (2.7)	44 (39.6)	63 (56.8)	4.5
Include tobacco-related questions on NAPLEX (n=106)	2 (1.9)	2 (1.9)	13 (12.3)	31 (29.2)	58 (54.7)	4.3
Partner with State Departments of Health (n=107)	0 (0.0)	5 (4.7)	13 (12.1)	41 (38.3)	48 (44.9)	4.2
Partner with tobacco quitlines (n=103)	0 (0.0)	5 (4.9)	14 (13.6)	36 (35.0)	48 (46.6)	4.2
Provide a train-the-trainer program for faculty with free CE (live or online) (n=110)	1 (0.9)	5 (4.5)	19 (17.3)	45 (40.9)	40 (36.4)	4.1
Provide a web-based "booster" training for students to complete, prior to APPEs (n=111)	3 (2.7)	14 (12.6)	33 (29.7)	31 (27.9)	30 (27.0)	3.6

a "No opinion" responses were removed from the denominator; < 5% for all items, except "partner with tobacco quitlines," which was 7.2%.
b Item wording: "Please rate how important the following are for advancing the role of pharmacy in tobacco cessation."
Abbreviations: NAPLEX, North American Pharmacist Licensure Examination; IPPE, Introductory Pharmacy Practice Experiences; APPE, Advanced Pharmacy Practice Experiences.

2.4 Discussion

This study was consistent with recommendations[48,49] for evaluating faculty training workshops: (1) highlight application, (2) apply theory, (3) use mixed methods, and (4) conduct long-term evaluation. In regards to application, the Rx for Change workshops aimed to equip participants with the necessary knowledge and skills to teach comprehensive tobacco cessation and empower them to champion the adoption of the Rx for Change curricular materials at their academic institutions. Additionally, the survey results provided evidence for enhanced performance in teaching, clinical practice, and research. In regards to applying theory, a theoretical framework was applied[38] in tandem with the phase 1 qualitative results. In regards to using mixed methods, during phase 1 of our research,[35] Kirkpatrick's four-level model[36] was applied as a framework to assess faculty members' reaction, learning, behavior, and outcomes that resulted from attending the train-the-trainer workshop. Results from the qualitative phase 1 informed development of the survey instrument to be administered in this phase 2 study. Through further quantification, this national survey capably characterized the impact of the workshops on implementation and sustainability. The mixed methods approach that was applied across the two phases is an appropriate methodology, given the relative lack of existing evidence to guide phase 2 survey development, and because it provided multiple sources of evidence.[50] Finally, the study provided a long-term evaluation (15 years after the workshop training), which can be challenging, yet useful and essential to the enhancement of health professional education.[48,49] This study adds valuable knowledge to the literature, particularly given that the pharmacy literature currently lacks long-term studies evaluating faculty development programs. Most studies evaluating the impact of workshops are conducted shortly after the training—as an example, a workshop training provided to pharmacy faculty aimed to enhance trainees' ability to implement and teach cultural competency in their pharmacy schools was evaluated 9 months later.[40] Another program that trained pharmacy faculty to implement a pharmacogenomics curriculum was evaluated after the training,[51] however, a longer follow-up evaluation has not been reported. In a review of published articles describing teaching and learning programs within pharmacy education, only one[52] of 21 programs focused on faculty training.[53] The study by Stein and colleagues evaluated the short-term impact (via pre- and post-surveys) of a 1-day faculty development training on teaching competency.[52] Experts in the medical education field have emphasized the importance of a long-term follow-up of faculty training programs, which is more likely to provide a better understanding of its maintenance and

long-lasting effects.[54] By following recommendations for evaluating faculty training programs,[48,49] this study exhibited methodological strengths in which a unique train-the-trainer workshop was evaluated.

These findings add to the body of literature and mirror results from research conducted with training programs for medicine faculty. Evidence was found for a positive impact of attending a workshop that aimed to prepare faculty to implement a tobacco cessation curriculum, and those who attended the workshop reported a valuable impact on their careers. Similar to prior studies, training resulted in high confidence in teaching[48,52,55,56] and providing clinical services to patients.[57,58] Participants in this study also implemented changes to their teaching and clinical practices as a result of participating in the train-the-trainer program, which is similar to findings in the medical literature.[59] Enhanced teaching strategies, such as utilization of active learning methods, was an important benefit from the training.[48,60] Similar to findings from a systematic review, partial adoption was more common than adoption of the entire program.[37] Yelon and colleagues posit that a suitable measure of the long-term positive consequences of training is enhanced performance, as well as talking with or advising colleagues about an idea or behavior.[54] In our study, three quarters of the faculty trainees advised others to consider adopting Rx for Change at their institution, which supports long-term impact of the program. Experts emphasize communicating to faculty trainees the expectations of these programs, that they are to apply and implement what they have learned, and to "broadcast this message at every possible opportunity."[49] With the Rx for Change program, most web-site users have indicated that they heard about the program from a faculty member or colleague;[44] this is further evidenced in the current study and likely has contributed to the sustained use of the curriculum over time. There is much to learn, however, from the medical profession—the medical literature describing *national* programs to train medical educators[59,61] can provide guidance for other professions. Educators and researchers are encouraged to contribute to the pharmacy literature by developing and evaluating similar initiatives.

In this study, a needed improvement was identified for teaching tobacco cessation in health professional programs. More than three quarters of participants indicated that fewer than six hours of tobacco cessation content is currently being taught in their institutions. According to an AACP white paper,[47] this is less than the minimum recommendation of six hours. Several steps have been initiated to achieve the needed improvements pertaining to preparing future pharmacists in

the area of tobacco cessation. To enhance learners' competency, confidence, and readiness to provide tobacco cessation counseling in clinical settings, tobacco-specific virtual patients and standardized patient/OSCE cases have recently been developed and are available to health professional educators through the Rx for Change website. More than three fourths of participants requested more information about these resources, suggesting an interest in further expanding tobacco education in schools of pharmacy. Given the large increase in the number of pharmacy schools since the last workshop in 2005, new dissemination efforts are needed and can include providing additional train-the-trainer programs, either as web-based enduring programs, in tandem with professional meetings, live on-site workshops, and live webinars.

A limitation of the study is the finite sample of potential participants, starting with a cohort of 191 faculty who attended a train-the-trainer workshop. Because of the long duration of time elapse, more than a quarter of the cohort was not locatable; however, of those invited, 81.0% completed a survey and this is a respectable response rate that provided valuable information regarding training workshop sustainability. Another limitation is the lack of a control group; however, a one-group cohort is a common study design for educational programs—a recent systematic review of medical faculty training programs determined that the majority of studies do not include a control group.[48] Additionally, another important limitation is the inherent weakness of self-reported opinions and behaviors (compared to objective measurements) and the potential for respondents to have forgotten the details surrounding their participation in the train-the-trainer program and subsequent events.[62] Despite these limitations, this study provides a unique contribution to the literature.

2.5 Conclusion

The study provides evidence for long-term reach, effectiveness, adoption, implementation, and maintenance of the Rx for Change program. Faculty members who attended a train-the-trainer workshop for a shared curriculum valued the impact of the training on their careers, confidence for teaching, confidence for patient counseling, and perceived their implementation of the Rx for Change program to positively impact their students. Faculty also reported positive changes in their practice as a result of workshop participation. The training workshop appears to have had a lasting, positive effect on implementation and sustainability 15 years later.

CHAPTER 3. STUDY TWO

The objective of this study was to synthesize data from prior studies and delineate recommendations guiding the future development of shared curricula in pharmacy education.

Applying Rogers' Diffusion of Innovations Theory as a guiding framework, relevant data were extracted from a two-phase mixed methods study evaluating the long-term impact of the shared Rx for Change: Clinician-Assisted Tobacco Cessation program. Phase 1 was a qualitative study in which telephone interviews were conducted with a subset (n=18) of 191 faculty members who participated in one of five train-the-trainer workshops conducted between 2003 and 2005. Qualitative results from phase 1 informed the development of a phase 2 national survey, which was administered electronically as a long-term follow-up (13 to 15 years later) with train-the-trainer workshop participants.

Data from the two-phase study yielded seven key factors to guide the development of shared curricula: (1) appeal to attendees, (2) relate content to clinical practice, (3) deliver live training (in-person), (4) develop high quality materials delivered by experts, (5) meet accreditation standards, (6) provide support, and (7) demonstrate effectiveness. Health topics for which a shared curriculum was perceived to be most useful were opioid dependence, drugs of abuse, medical marijuana, and motivational interviewing.

Faculty perceived shared curricula to be a cost-effective approach to teaching that should be more broadly considered for incorporation into pharmacy education. Future program developers should consider several key factors that enhance participation, implementation, and long-term engagement.

3.1 Introduction

Health professional educators are responsible for improving students' foundational knowledge and clinical skills. To achieve this goal, high-quality, engaging, evidence-based teaching materials are needed for relevant topics across multiple years of a degree program. Because individual faculty members typically create their own lecture materials, this translates into hundreds of faculty members creating comparable materials on similar topics. This approach

is inefficient, costly, and does not capitalize on the collective knowledge and wealth of experience of faculty across the nation.

One solution to promote quality while reducing faculty burden is the concept of "shared curricula." We define a shared curriculum as an open access, comprehensive curriculum covering a specific topic that is created by a group of content experts, yet evolves over time based on input from faculty members who have utilized the materials. Currently, few shared curricula have been broadly disseminated within and/or across health professional programs. Nonetheless, faculty educators value having access to shared curricular content and perceive it as a resource for teaching materials that *"prevents everyone from having to recreate the wheel."*[35] Health care topics for which a shared curriculum have been developed in recent years and made available at no cost for pharmacy educators include pharmacogenomics,[39] cultural competence,[40] and infectious diseases.[41] While developing shared content is an important first step, it is equally (if not more) important to develop effective methods to ensure its broad-scale dissemination, adoption, and sustainability. Unfortunately, the existing literature provides little guidance with respect to these important steps.

Twenty years ago, results of a survey of pharmacists in California identified a need for enhanced tobacco cessation training in pharmacy schools.[17] In 1999, faculty from four schools of pharmacy in California created a shared tobacco cessation curriculum (*Rx for Change: Clinician-Assisted Tobacco Cessation*, https://rxforchange.ucsf.edu) to fill this educational gap. With funding from the National Cancer Institute, two faculty members from each pharmacy school in the United States were invited to attend one of five 2.5-day train-the-trainer workshops conducted between 2003 and 2005. Significant effort went toward identifying the most appropriate faculty members to participate, with an emphasis on recruiting one person who could capably teach the biological basis of dependence and another who could teach the behavioral aspects of quitting and facilitate pharmacy practice skills laboratories. For all attendees, travel and expenses were paid using grant funds. A total of 191 participants, representing 89 of 91 pharmacy schools existing at the time (98%), attended a workshop and returned to their schools to integrate the Rx for Change teaching materials into their Doctor of Pharmacy curricula.[4] The initiative has been shown to be sustainable in the long-term, with an estimated 73% of pharmacy schools using the Rx for Change content as part of their core curriculum 15 years later.[34] This long-term sustainability warranted further exploration, and in 2017-2018 we conducted a qualitative interview study with faculty who

had participated in a train-the-trainer workshop. The first interviewee stated, *"I'm not sure what that special ingredient is that makes some of these [workshops] work really well and some of them not."* This comment inspired us to investigate further why the Rx for Change faculty development workshops were successful and what could be learned from this experience to be applied in the future. The objective of this study was to delineate factors that could guide future shared curriculum development efforts.

3.2 Methods

3.2.1 Overarching theoretical framework

Development and dissemination of the Rx for Change program, as well as the long-term follow-up studies described here, applied Rogers' Diffusion of Innovations Theory as a guiding framework.[42] This approach encompasses five domains ("characteristics of the innovation") that influence adoption of a new program: (1) relative advantage - the degree to which an innovation is perceived by users as better than previous ideas, (2) compatibility - the innovation is perceived as being consistent with the values, past experiences, and needs of potential adopters, (3) simplicity - the degree to which an innovation is perceived as easy to understand and use, (4) trialability - the degree to which experimentation is possible with an innovation, and (5) observability - the ability to see the results of an innovation. By explicating how participants view the aforementioned five factors, one can attempt to identify key characteristics of an innovation that are associated with its adoption and sustainability.[42]

3.2.2 Research approach

Relevant data were synthesized from a two-phase mixed methods study (summarized below; details provided elsewhere[35,63]) evaluating the long-term impact of the Rx for Change program and its train-the-trainer workshops.

Phase 1. Phase 1 applied a descriptive qualitative approach,[64,65] exploring factors that trainees believed contributed to success of the Rx for Change dissemination approach. A subset of randomly-selected faculty trainees (n=18 of the original 191 trainees) participated in semi-structured telephone interviews, which were audio-recorded and transcribed. Qualitative analysis was conducted using an inductive approach with MAXQDA software.[66] Two investigators coded

transcripts independently to identify relevant factors and then met to compare, discuss, and reach consensus. Phase 1 was conducted between 2017 and 2018.

Phase 2. The findings from phase 1 informed the development of a web-based survey for administration to the entire cohort of train-the-trainer participants.[63] The instrument estimated the impact of the workshops with respect to: (a) Reach to pharmacy schools across the United States, (b) Effectiveness on faculty confidence, their students' confidence, and tobacco cessation-related practices, (c) Adoption of the Rx for Change materials for teaching tobacco cessation, (d) Implementation of Rx for Change in pharmacy schools and challenges faced, and (e) Maintenance of the adoption of the Rx for Change materials for long-term use.[38]

The phase 2 survey was estimated at 15 minutes to complete, although was briefer for individuals who were no longer working in academia. Because 15 or more years had elapsed since participating in a train-the-trainer program, extensive internet searches were conducted to locate individuals. Of 191 initial faculty participants, valid and current email addresses were identified for 137, and the survey was completed by 111 (81.0%). Descriptive analysis were conducted using SPSS software version 26.[46] Phase 2 was conducted between 2019 and 2020.

3.3 Results

Characteristics of study participants are described elsewhere.[35,63] Across both phases, faculty participants described several aspects of the Rx for Change program that were perceived to be associated with program success. Seven core factors (Table 6) were identified in phase 1, five of which were further explored in phase 2. To reduce the overall length of the survey, two factors ("Meets accreditation standards" and "Demonstrate effectiveness") were omitted from the phase 2 study, because both were deemed essential for any program that is to be disseminated within academia and therefore perceptions are less relevant. Each of the seven core factors identified in phase 1, and those that were further clarified in phase 2, are discussed below.

Table 6. Qualitative findings (representative quotations from Phase 1) and quantitative findings (survey responses from Phase 2) related to key factors for successful shared curricula. The factors are mapped to Rogers' Diffusion of Innovation Theory.[42]

Phase 1 themes		Phase 1: Representative quotations	Phase 2: Quantitative findings	Rogers' Diffusion of Innovation element
1	Appeal to attendees	*"I was interested in the [tobacco epidemic] topic and it was a great opportunity for me as a faculty member and for the school to start our students in the [Rx for Change] curriculum."*	Reasons for attending a train-the-trainer program (% reporting very or extremely important): • to improve the teaching for tobacco cessation (86.2%) • to improve the tobacco content in our curriculum (78.7%) • to improve skills for treating tobacco use and dependence (78.0%) • to be part of this national initiative (57.3%) • an opportunity to meet colleagues with similar interests (52.8%) • was encouraged by a mentor/colleague (47.5%) • was required or encouraged by university administration (41.9%) • an opportunity to travel to San Francisco at no cost (17.4%)	Relative advantage
2	Relate content to clinical practice	*"When…confronting a patient about tobacco use, if you feel more confident and competent in the approach, you are more likely to use it."*	• 96.4% perceived that having students apply tobacco cessation counseling skills during IPPE/APPE rotations to be very/extremely important • 84.0% perceived that including tobacco-related questions on the NAPLEX examination to be very/extremely important • 81.3% perceived the program to be very/extremely impactful on students' competency for tobacco cessation counseling • 78.1% perceived the program to be very/extremely impactful on students' readiness to apply their knowledge in practice • 73.6% perceived the program to be very/extremely impactful on students' confidence for tobacco cessation counseling	Observable results
3	Deliver live training	*"We were all away from our primary place of work, really immersed in [the live training]. We were focused."*	• 67.3% perceived that conducting more live, on-site train-the-trainer workshops would be very/extremely effective • 23.6% perceived the training to be moderately effective • 9.1% perceived the training to be a little/not at all effective	Relative advantage
4	Develop high quality materials, delivered by experts	*"I realize all the hard work that went into developing the materials…they are top notch and of high quality and it was always something that you could definitely implement knowing confidently that the materials were spot on"*	Perceived the program to have high (H), moderate (M), low/none (L) ratings for: • Relative advantage over other materials: 70.7% H, 22.8% M, 6.5% L • Compatibility with existing curriculum structure: 71.2% H, 24.0% M, 4.8% L • Simplicity of implementing Rx for Change: 74.1% H, 23.1% M, 2.8% L Other factors: • Appropriateness of teaching methodologies: 80.7% H, 16.5% M, 2.8% L • Comprehensiveness of content: 90.1% H, 9.9% M, 0% L	Relative advantage, compatibility, complexity

Table 6 continued

5	Meets accreditation standards	*"[The curriculum committee] has to value [the new curriculum] It's not just enough for a faculty member to say this is important. Everything has to be linked to a standard or a competency."*	Not assessed in phase 2.	Relative advantage
6	Provide support	*"The materials are updated frequently enough. The relevant information in terms of the pharmacotherapy options, videos, and case scenarios...every time I go to that website, at least annually but often much more frequently...it's updated."*	Perceived usefulness of the Rx for Change web-site: Extremely, 49.4%; very, 40.5%; moderately, 8.9%; a little, 1.3%	Relative advantage
7	Demonstrate effectiveness	*"You really want to know if it [the program: training and subsequent curriculum implementation] had an impact on individuals."*	Not assessed in phase 2.	Trialability

Abbreviations. NAPLEX: North American Pharmacist Licensure Examination; IPPE: Introductory Pharmacy Practice Experiences; APPE: Advanced Pharmacy Practice Experiences

3.3.1 Appeal to attendees

Participants indicated a number of factors related to the Rx for Change program that were appealing and impacted their decision to attend the workshop. Specifically, the workshop provided an opportunity to bring new information about tobacco cessation back to their institutions, thus filling a gap in their curriculum. Other appealing attributes included: teaching materials were freely accessible online, travel was funded by a grant from the National Cancer Institute, and the program addressed a topic of personal interest. When asked in the survey what influenced their decision to attend the train-the-trainer workshop, the most highly rated reason was to improve their teaching of tobacco cessation content.

3.3.2 Relate content to clinical practice

Participants indicated that Rx for Change had a high degree of relevance to clinical practice. Many mentioned that the "hands-on" activities were particularly helpful, including handling of the various pharmacotherapy agents. They also indicated that motivational interviewing approaches, which involve a *"really complex set of skills,"* helps them improve patient counseling services in clinical practice.

Participants emphasized that all training programs should be relevant to practice and should facilitate attendees' confidence and competence for teaching the material to their students and helping students apply the material. Participants acknowledged that implementing a new clinical service is challenging and therefore suggested that training programs should address how to successfully implement such services in practice settings.

3.3.3 Deliver live training (in-person)

Participants appreciated that Rx for Change was delivered using an in-person format. They indicated that attending the program in person provided an opportunity to become *"really immersed"* in learning the material. They felt this format allowed for the use of a variety of methods of content delivery, including *"hands-on"* activities, decreased distractions, and opportunities to network and interact with other faculty members with similar teaching responsibilities and interests.

Some participants, however, pointed out the advantages of web-based training programs, such as decreased cost, elimination of travel, and less time away from work. Several participants valued a blended workshop, with live in-person training followed by web-based sessions delivered regularly. One participant explained, *"I personally like the live training, particularly for the first time that you're going through it."* Moreover, they remarked that web-based training can reach a wider audience, is more convenient due to asynchronous delivery, and can provide opportunities for trainees to view recorded sessions more than once. Some participants suggested, however, that web-based training might not engage participants if trainees are not *"truly invested in learning."* A participant remarked, *"When you do any kind of web-based [training], it's easy to not feel connected to the rest of the people in the group and lose motivation."*

3.3.4 Develop high quality materials, delivered by experts

Participants indicated that the high-quality, evidence-based materials contributed to the overall success of Rx for Change. They valued that experts were selected to deliver these workshops. Results from the survey confirmed that participants rated the quality of the Rx for Change curriculum highly, including the various "characteristics of the innovation" described by Rogers.[42]

Participants suggested few enhancements to the structure and content of future training programs, including how to deliver curriculum using 'newer' methods. As one participant illustrated, *"…here's a way of [implementing the curriculum using] team-based learning principles, here's a way of doing it using online instruction, here's the way of doing it in a flipped classroom. So, there is probably a wider range of methodologies that are being used to teach."* Some suggested adding discussions on recently published studies, and others suggested adding discussions on controversial topics. Several participants suggested adding instructions on how to deliver the curriculum in a limited time: *"Some more on how to [teach content] in [a] limited time. What will be the best things to include if you had limited time? How to prioritize those things? Especially from a new faculty member's perspective it was all just a bit overwhelming…So if you don't have the amount of time to [implement] everything or are overwhelmed with everything, what's the best place to start?"*

3.3.5 Meet accreditation standards

In phase 1, participants shared that Rx for Change was successful because it met accreditation standards and addressed required competencies. As such, faculty could easily "pitch" the content to the curriculum committee at their institution.

3.3.6 Provide support

Participants appreciated the efforts devoted by the Rx for Change team to support faculty attendees. They described three types of perceived support. First, the availability of a website to access routinely updated teaching materials (https://rxforchange.ucsf.edu). In the phase 2 survey, 89.9% of the 86 participants working in academia rated the Rx for Change web-site to be 'very' or 'extremely' useful for supporting teaching of tobacco cessation. Second, participants valued that they were invited to the training with another colleague from the same institution, and this was perceived as a facilitator for implementation of the content. For example, one faculty member said: *"so definitely I and [my colleague] who did the training as well, she's been a supporter."* Third, participants appreciated the cessation aids (patches, gum, lozenge, inhaler, spray) that were provided after the training, as it helped them to instruct students and patients on their proper use through hands-on demonstration.

3.3.7 Demonstrate effectiveness

While the phase 1 interviewees did not mention that they were aware of published evidence demonstrating effectiveness of the Rx for Change program,[32,67-69] they did emphasize that training programs must show impact. They mentioned four ways that training programs should be evaluated: (1) determine whether the learning objectives were met, (2) determine whether the curriculum was successfully implemented at the trainees' institutions, (3) estimate impact on student outcomes using pre- and post-training surveys, and (4) conduct studies to estimate the distal impact on patients. While some of these are beyond of the scope of most train-the-trainer programs, they would enhance perceptions of programs that are being disseminated.

3.3.8 Future directions for shared curricula

Perceptions of shared curricula, in general, are delineated in Table 7. Many participants (77.9%) who currently work in an academic setting agreed that shared curricula should be more broadly considered for use in pharmacy schools. In phase 1, participants suggested health topics for which a shared curriculum would be useful, and these were further explored in phase 2. Participants rated the following as very or extremely useful as a shared curriculum topic: opioid dependence (82.9%), drugs of abuse, including but not limited to opioids (76.6%), medical marijuana (71.1%), motivational interviewing (67.5%), pain management (63.0%), alcohol abuse (63.9%), obesity (59.4%), and law/jurisprudence (44.1%).

Table 7. Faculty perceptions of shared curricula in pharmacy education (n=87 faculty members currently working in academia).

Characteristic	Agree	Neutral	Disagree
Shared curricula (in general) are a cost-effective approach to teaching	79.0	17.4	3.5
Shared curricula should be more broadly considered for use in pharmacy schools	77.9	18.6	3.5
Availability of a shared curriculum limits academic freedom	16.3	12.8	71.0
Availability of a shared curriculum limits creativity	24.4	15.1	60.5
Availability of a shared curriculum limits the feeling of "ownership"	32.6	22.1	45.3

3.4 Discussion

The objective of this analysis was to synthesize findings from a mixed-methods study to craft recommendations for future developers of shared curricula. The Rx for Change program provides a unique framework for this type of analysis, because it has been in existence since 1999 and was disseminated nationally, through train-the-trainer faculty development programs, to 98% of the schools of pharmacy that existed in 2005.[4]

Because it is an appropriate framework for exploring factors associated with adoption of an innovation, Rogers' Diffusion of Innovations Theory guided the development and dissemination

of Rx for Change and the two-phase study described herein.[42] Data indicate that the 'relative advantages' of the Rx for Change faculty training workshop that were important, from participants' perspective, was that it appealed to attendees (factor 1), was delivered live (factor 3), met accreditation standards (factor 5), and provided ongoing support (factor 6). Compatibility and simplicity were also important, in that participants perceived the curriculum to be of high quality and easy to understand (factor 4). Trialability of the program was evident because the program has demonstrated effectiveness in other research studies described in the literature (factor 7).[32,67-69] Finally, observable results were described by faculty in terms of perceived impact on students' competency, confidence, and readiness to apply the learned skills (factor 2).

Our study complements the existing knowledge available in the literature. Participants indicated that certain aspects were important in making a training workshop appealing to faculty attendees (Factor 1). These include removing cost burdens, a topic covering an important gap in pharmacy education, and training faculty to acquire skills needed as educators. These findings are consistent with guidance provided in the medical education literature, in which skills taught during a training is an important factor for the success of a faculty development program.[49] Pharmacy education literature, such as that described by Greene et al., suggests the importance of teaching curricula using engaging methods, such as "active learning," rather than solely using traditional lecture-based approaches (Factor 2).[70] Based on our results and the studies by Lupu et al. and Bookstaver et al., it is recommended that pharmacy curricula be delivered in a way that boosts students' confidence and competence to effectively translate what they learned in the classroom into real-world patient cases.[71,72] This also mirrors the Accreditation Council for Pharmacy Education's (ACPE) requirements to enhance "knowledge application and practice competencies" among pharmacy students (Factor 5).[73] Active learning was an intentional approach incorporated into the development of the Rx for Change curriculum, and such approaches are therefore recommended for similar future endeavors. Additionally, to promote the application of knowledge and skills learned, medical education researchers have established the importance of providing support to faculty participants (Factor 6).[54,74] When faculty trainees receive adequate support, they are more likely to use and apply what they have learned during their training.[54] Our study has therefore contributed to the pharmacy literature in this area, which is currently scarce.

Because participants were interviewed and surveyed 15 or more years after their workshop training, it is likely that they had forgotten some aspects of the program. Yet, this time lapse is also

a strength because it was more likely that participants recounted only the most salient or memorable aspects of their experiences, whether they were positive or negative. However, because of the time that had elapsed, 26.3% of our participants were unable to be located for the phase 2 survey study,[63] and this could have biased the results. Finally, the recommendations for developing and disseminating shared curricula are made based on our experiences with Rx for Change within the pharmacy profession and therefore might not be generalizable to other programs, other clinical content areas, other health disciplines, or other initiatives that did not benefit from federal funding through grants over the years. However, the recommendations that are provided are likely important considerations when embarking on similar, new endeavors.

3.5 Conclusion

This investigation provides evidence and guidance related to key factors that are likely to enhance the long-term success of shared curricula within the health professions. To enhance participation and long-term engagement, future training program developers should consider the motivating factors that appeal to trainees. The program is more likely to be sustainable if it includes practical application (hands-on) components in training workshops and when high quality, evidence-based materials are developed and maintained by experts in the field. Faculty members viewed shared curricula as a cost-effective approach to teaching that should be more broadly considered for incorporation into pharmacy education. The validity of the guidance provided could be tested in the development of shared curricula for key topics identified, including opioid dependence, drugs of abuse, medical marijuana, and motivational interviewing.

CHAPTER 4. STUDY THREE

Because tobacco use is a major cause of morbidity and mortality worldwide, it is essential to prepare healthcare providers to assist patients with quitting smoking. To fill an educational gap in tobacco cessation training in health professional schools, the Rx for Change shared curriculum was created in 1999. In 2004, a website was launched to host all the teaching materials, providing teaching tools for educators and clinicians. The purpose of this study was to characterize the website users and utilization over time.

Data from the Rx for Change website has been collected prospectively since its launch. In this study, 15-years of end-user data were analyzed to determine users' location, discipline, student status, how they were referred to the website, intended use of the materials, and number of file downloads and logins over time.

Total number of website registrants were 15,576 representing all 50 states and 94 countries. The most represented discipline was pharmacy (41.2%), and nearly half of users were students or residents. The most common source of referral to the website was a faculty member or colleague (33.4%), and the purpose of enhancing personal knowledge and skills was the most commonly cited intended use of the curricular materials. A total of 259,835 file downloads occurred during the study period, and the most commonly downloaded file type was ancillary handouts.

The Rx for Change website demonstrated sustainable support by providing immediate access to tobacco cessation teaching and practice tools for educators and clinicians. The website had a broad interprofessional reach, which increases the likelihood of smokers receiving assistance from multiple professions. The consistent utilization over time and large number of downloads provided evidence for the impact of a public access website hosting a shared tobacco cessation curriculum for health professionals.

4.1 Introduction

Tobacco use is a major cause of morbidity and mortality worldwide, with an estimated 7 million deaths annually due to tobacco-related illnesses.[75] Hence, tobacco use remains a public epidemic that predisposes individuals to an increased risk of developing a multitude of diseases and contributes to rising healthcare costs.[5] According to the 34th report of the Surgeon General,[8]

the prevalence of cigarette smoking among American adults is at an all-time low of 14%, emphasizing how clinical interventions for smoking cessation delivered by healthcare providers contributed to this public health achievement. Thus, it is imperative to equip future healthcare providers with tools to advise and assist tobacco users with quitting.

In response to a decades-long gap in teaching tobacco cessation content in all health professional schools, including medical,[18-20] nursing,[14,15] pharmacy,[21] dental hygiene,[22] physician assistants,[23] and respiratory therapy[24]), the evidence-based Rx for Change: Clinician-Assisted tobacco cessation curriculum was developed in 1999.[2] Over the past two decades, the curriculum has been disseminated using a variety of approaches, grounded in Rogers' Diffusion of Innovations Theory. An important approach for dissemination was the development of a public access website that hosts all the Rx for Change curricular materials. There are several versions to this curriculum, which address the different specialties that can benefit from tobacco cessation educational materials. PowerPoint slides and audience handouts are downloadable and can be used by educators to teach in a lecture-based format. Additional teaching materials include dozens of videos, case materials for role playing, ancillary handouts for clinicians and patients, a suite of virtual patients, and standardized patient cases with associated scoring algorithms for conducting objective structured clinical examinations (OSCEs), along with tools to assist faculty with implementation of all aspects of the Rx for Change curriculum.

Educational experts have placed much value on developing educational programs, but have also emphasized the need to evaluate such programs.[48] Unfortunately, when websites are created to host educational materials, they are often short-lived before becoming outdated or dormant after grant funds expire. The Rx for Change program was created more than two decades ago and its website is updated annually and when needed with respect to changes in clinical practice (e.g., post-launch of a new medication, inclusion or removal of a boxed warning, etc.);[3] however, its usage has yet to be characterized. Such knowledge would be helpful in understanding the impact of providing shared curricular materials electronically, and also would inform future developers of curricula about potential usage and benefits of hosting materials online. Therefore, the purpose of this study was to characterize the Rx for Change website usage.

4.2 Methods

User and utilization data have been collected prospectively via the Rx for Change website (https://rxforchange.ucsf.edu; Figure 2) since its launch in 2004. For the purpose of this study, the data were extracted for a period of 15 years, ranging from the public launch date on April 1, 2004 to March 31, 2019. Individuals who registered on the website provided contact information, including their state and country, their primary discipline (medicine, nursing, pharmacy, respiratory care, dentistry, health educator/peer counselor, other), whether they were a student or resident, how they heard about the Rx for Change program, and their intended use of the materials. In addition to user characteristics, prospectively collected data included various utilization measures: files downloaded (frequency and type), number of file downloads per user, number of logins, and trends in utilization over time. Note that all video files on the website are permitted to be downloaded and/or streamed directly on the website, and the streaming occurrences are not linkable to individual users and therefore were not captured along with the number of file downloads.

Figure 2. Rx for Change screen-shot for the homepage.

With respect to data interpretation, it is important to note that all programmatic materials were not available at the launch of the website in 2004—a version addressing brief counseling (Ask-Advise-Refer) was launched in November 2007, and new discipline-specific versions (e.g., psychiatry, respiratory care, peer counselor, cardiology, and surgical care) became available over time. Along with the annual updates, new videos and role-playing case materials were added or modified to be consistent with clinical practice guidelines. Most recently, in 2019, a suite of six standardized patient cases with scoring rubrics for OSCEs were added along with a link to a suite of tobacco-specific virtual patients (https://virtualrx.ucsf.edu). No proactive efforts were made (e.g., no e-mail notifications) to alert users to the availability of new or updated content, and at no time during the 15-year period was the website inaccessible for more than a few hours at a time during updates or server maintenance.

Rogers' Diffusion of Innovation Theory[42] was used to guide elements of data interpretation in this study. The theory states that new programs are more likely to exhibit enhanced adoption if they possess five main characteristics: (1) relative advantage over existing programs; (2) compatibility with existing values, experiences and needs of potential adopters; (3) how complex the program is to understand and use; (4) trialability, or the extent to which a potential user can test or experiment with a program before committing to adoption; and (5) observability, i.e., the extent to which the program provides tangible outcomes.

Data cleaning occurred at the individual user level, which included combining duplicate registrants (e.g., identical users who established separate accounts with different email addresses) and reclassifying disciplines where appropriate and re-categorizing data response options labeled as "other" (e.g., user checked 'other' for the discipline field but provided information consistent with existing response options). Data were analyzed using the SPSS statistical software platform, version 26.[46] The study was approved by the University of California, San Francisco and Purdue University Institutional Review Boards for the protection of human subjects.

4.3 Results

4.3.1 User characteristics

A total of 15,576 unique users registered on the Rx for Change website during the study period. Registrants represented all 50 states and 94 different countries. Among users with a designated health discipline (n=15,505; 99.5%), the top represented disciplines were pharmacy (41.2%), followed by nursing (21.8%) and health educators/peer counselors (10.7%; Table 8). Students and residents represented 49.7% of all registrants.

Of non-students/residents, approximately one third (33.4%) reported hearing about the website from a faculty member or colleague, at a conference, meeting or workshop (16.8%), while surfing the internet (16.7%), on an internet LISTSERV (9.5%) distributed by the University of California Smoking Cessation Leadership Center (6.8%), or in a newsletter publication or article (6.0%). The most commonly selected intended use of the Rx for Change materials was to enhance personal knowledge and skills (79.3%); 30.2% indicated that they intended to teach licensed health professionals, and 39.2% intended to teach health professional students (39.2%) (categories not mutually exclusive).

Table 8. Number (%) of represented disciplines among 15,505[a] end-users reporting discipline and student/resident status.

Disciplines	Non-student/resident	Student/resident	Total
Pharmacy	1,790 (23.1)	4,603 (59.4)	6,393 (41.2)
Nursing	1,305 (16.8)	2,072 (26.7)	3,377 (21.8)
Health educator/peer counselor	1,461 (18.8)	192 (2.5)	1,653 (10.7)
Medicine[b]	677 (8.7)	239 (3.1)	916 (5.9)
Respiratory care	440 (5.7)	127 (1.6)	567 (3.7)
Dentistry	174 (2.2)	87 (1.1)	261 (1.7)
Social work	112 (1.4)	21 (0.3)	133 (0.9)
Other	1,799 (23.2)	406 (5.3)	2,205 (14.2)
Total number	**7,758 (49.8)**	**7,747 (49.7)**	**15,505**

[a] n=71 (0.5%) end-users did not provide data describing their student/resident status and discipline.
[b] Includes physicians and physician assistants.

4.3.2 Website utilization characteristics

During the evaluation period, 259,835 files were downloaded by 12,387 users, representing 79.5% of all website registrants. While the remainder of the registrants (n=3,189; 20.5%) might have streamed videos on the website, they did not download any files. The file type most commonly downloaded was ancillary handouts (n=61,348), followed by counseling videos (n=58,109) and instructors' PowerPoint slides (n=49,501) (Table 9). Across the 15-year time period, users logged into the website a total of 62,172 times. Login frequency and download frequency trends over time are shown in Figure 3.

Table 9. File downloads (n=259,835), by teaching tool.

Teaching tool	Description of tool	Number of downloads n (%)
Ancillary handouts	Tools that clinicians can use when helping patient, e.g., tobacco cessation counseling guide, withdrawal symptoms information sheet, drug interactions with smoking table, tobacco use log, coping strategies for patients, pharmacologic product guide)	61,348 (23.6)
Counseling videos	Video segments demonstrating counseling of a wide range of patients (e.g., ready to quit, not ready to quit, recent quitter) in many patient care settings	58,109 (22.4)
PowerPoint teaching slide files	PowerPoint slides with detailed instructor notes and relevant literature citations	49,501 (19.1)
Audience slide handouts	PDF versions (6 slides per page) of the PowerPoint slides	32,024 (12.3)
Role playing cases	Handouts for role playing with a wide range of patient case scenarios (e.g., ready to quit, not ready to quit, recent quitter)	22,809 (8.8)
Trigger tape videos	Brief video segments (1–2 phrases from an actor who plays the role of a patient), that is used as a stimulus to elicit, or "trigger," discussion with learners	17,959 (6.9)
Instructor tools	Guides and other resources to facilitate implementation of the Rx for Change curriculum	8,749 (3.4)
Introductory videos	3-min video created by the US Surgeon General highlighting the need for health-care providers to address tobacco use and an 8-min introductory video of interviews with smokers	3,582 (1.4)
Reading materials	Recommended background readings (e.g., PDF versions of textbook chapters and continuing education programs on tobacco cessation).	3,451 (1.3)
Administrative tools	End-user license agreement, sample medication order forms, tracking forms, etc.	2,213 (0.9)
OSCE case materials[a]	Standardized patient cases (n=6), with corresponding scoring algorithms for formative and evaluative exercises	90 (<0.01)

[a] OSCE = Objective Structured Clinical Examination; these tools became available on the website in 2018.

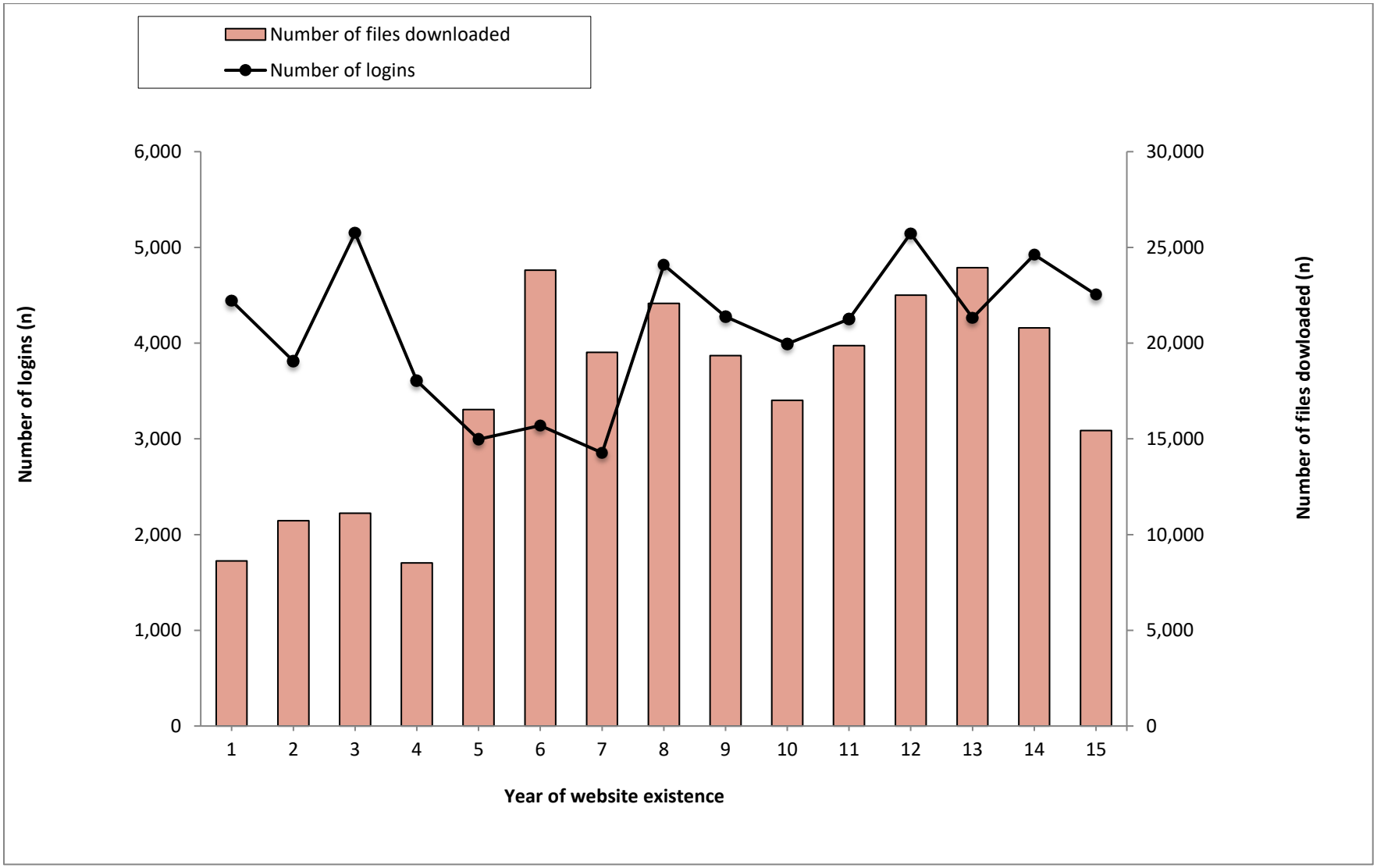

Figure 3. Number of files downloaded and number of logins, per year (2004–2019).

4.4 Discussion

This study adds to the literature important knowledge regarding the extent to which health professional educators, clinicians, and students utilize a website that was designed to house educational materials for tobacco cessation. The study complements our concurrent research evaluating the Rx for Change program, thus providing a more complete picture of the program's reach and long-term impact.[35,63] Although an abundance of existing literature describes web-based interventions for tobacco cessation,[76] to our knowledge there are no studies that characterize internet-based access to tools designed to facilitate faculty and students in their teaching and learning roles and clinicians in their patient care roles. Current literature addressing professional educational websites other than tobacco cessation is also scarce. We have identified three websites that house teaching materials (for pharmacogenomics, infectious diseases, and diabetes mellitus);[39,41,51,77,78] however, utilization of these sites has not been described in the literature.

This study provides objective measures, which are more robust than self-report measures. Rogers' Diffusion of Innovation Theory was used to develop and disseminate the Rx for Change curriculum and evaluate the adoption process. According to the theory, five main characteristics determine the likelihood of adoption of a new innovation. Most users learned about the Rx for Change website from another colleague, which suggests that colleagues perceived the website and its materials to possess a relative advantage over other available sources. Compatibility was shown by the fact that website registrants' most commonly cited intention for use of the curricular materials was to enhance their own knowledge and skills. Trialability and perceived acceptability of the complexity of the Rx for Change program were evident by the large number of registrations and continued use over time. An observable result was the large number of file downloads from the website.

Previous findings suggest that the availability of a website to host all materials is a useful resource for health professional educators, and users report appreciation for access to regularly-updated teaching materials.[35] In our study, the most frequent referral source was a faculty member or a colleague (33.4%). These findings are consistent with those identified in the evaluation of a web-based mental health portal, for which the highest utilization was among individuals personally invited to visit the website.[79] Thus, an effective mode of dissemination is learning about the program and/or its website from professional or social network. Although no proactive efforts were

made to alert users about updates or new content, this is a strategy that could be considered in the future as well as a brief survey of user needs to provide guidance for future program enhancements.

Limitations of this study include a possibility of duplicate users who utilized different e-mail addresses when registering on the website. This was addressed by manually reviewing registrations that appeared to belong to the same person, and through discussion and consensus, the team determined when it was appropriate to combine them. The number of file downloads found in this study is an underestimate, because of the videos that can be viewed directly from the website, without downloading. Also, the number of file downloads underestimates actual usage in the classroom or in clinical practice—for example, an instructor or clinician might download the content once and use it on a regular basis until the next update of the program materials, and these implementation activities are not captured by the Rx for Change website. Finally, because the ability to evaluate the long-term utilization of shared curricular resources is fully dependent on the ability to maintain the quality and accessibility of the materials, the results presented here are relevant to the tobacco cessation program and might not be generalizable to other websites or other content areas. Furthermore, the sustainability of any program is significantly challenged without ongoing funding and personal commitment of the program authors.

4.5 Conclusion

The Rx for Change website demonstrated sustainable support by providing immediate access to shared, evidence-based tobacco cessation teaching and practice tools for educators and clinicians. Since 2004, the website has served as a consistent backbone for supporting broad interprofessional reach, which increases the likelihood of smokers receiving assistance from multiple professions. The consistent utilization over time and large number of downloads provided evidence for the impact of a public access website. Hosting the shared curriculum materials online was useful and was consistently accessed for 15 years by students, clinicians, and educators. A website that hosts high quality, frequently updated materials is an effective method for sustained dissemination of shared curricular materials. The shared curriculum concept, in tandem with a frequently-updated website to host curricular materials, can be replicated for other topics of public health importance.

CHAPTER 5. DISCUSSION

These three studies, when taken in combination, are novel in that they provide a comprehensive, long-term assessment of a shared curriculum that has been in existence for more than two decades. In a previous study, we described pharmacy faculty members' perceptions and experiences associated with participation in the train-the-trainer program and the process of implementing the Rx for Change curriculum at their institutions. This dissertation describes the impact of the train-the-trainer programs on reach and sustainability of the Rx for Change program. The new knowledge presented here can be used by future curricular creators and inform them of the potential positive impact as well as recommendations for creating and disseminating shared curricula—an approach to health professional education that should be considered for wide adoption, given the rapid advances in medicine that must be integrated into curricula to ensure that students are equipped with the knowledge and skills to implement evidence-based medicine. Additionally, the research presented here provides a foundation for future studies to evaluate the end-result of trainings (i.e., the effectiveness of pharmacists and other clinicians on tobacco cessation in diverse patient populations).

5.1 Contribution to the pharmacy literature

Long-term evaluations have occurred in the field of medicine. Knight and colleagues qualitatively and quantitatively described the long-term impact of a faculty training program on trainees' teaching skills, 7 to 15 years later,[80,81] and Gozu and colleagues evaluated the impact of a curriculum development training for medical educators 13 years later.[82] Yelon et al. interviewed four faculty trainees 2 to 3 years post-training and four trainees 9 to 10 years post-training to evaluate the process of applying knowledge.[54] These are some of the very few studies that conducted a follow-up evaluation many years after a training to estimate sustainability of knowledge, skills, or behavior. However, studies that have evaluated long-term impact of training programs within the pharmacy profession are scarce; one study has been identified in which a 9-month follow-up evaluation was conducted after the training.[40] The three studies described here address the impact of a curriculum that has been sustained for more than 20 years as well as the impact of a train-the-trainer program on faculty participants 15 years later.

5.2 Benefits of shared curricula

Creating evidence-based shared curricula is a relatively new concept that offers many benefits. First, curricular materials are created by the experts in the field of study, requiring the efforts of only few individuals yet producing a robust product that can be used by many. Second, it provides efficiency and saves time. Faculty members who would utilize the curriculum at their institutions do not need to prepare lecture materials or content for their lectures or practice laboratories; instead, they can focus their energies on teaching the content and providing their students with constructive feedback for improvement. Third, shared curricula are, by their very nature, cost-effective. With this model, it is not necessary for all pharmacy schools to allocate effort toward the preparation and update of content. Such resources would then be redirected toward other important efforts such as clinical application of the topic covered by the shared curriculum. In short, creating and disseminating shared curricula freely, to be used without cost and without limitations, prevents "recreating the wheel" by faculty at each institution each year. Dr. Lucinda Maine, Executive Vice President of the American Association of Colleges of Pharmacy – AACP), recommends such initiatives.[83] In her article, "Sharing our Wealth," she indicated that AACP provided a letter of support to the developers of Rx for Change to accompany their grant submission to the National Institutes of Health, and the organization would provide such support for similar endeavors.[83] Furthermore, she emphasized that the pharmacy profession could learn from the medicine profession's experience in encouraging teaching resources to be readily available to faculty educators.

5.3 Topics that would benefit from creating shared curricula

Important topics that have been developed as a shared curriculum include tobacco cessation,[3] diabetes,[78] cultural competency,[40] pharmacy-based immunizations,[84] medication therapy management,[85] infectious diseases,[41] pharmacogenomics,[51] and end-of-life care.[86] Although not all of the above-mentioned programs are available at no cost, they collectively have impacted public health and enhanced the role of pharmacy. Free programs can be superior by eliminating cost as a barrier to use, and because they are readily available they might be more likely to be utilized. There is a plethora of other topics that are of public health importance for which pharmacists can make a substantial impact if they receive adequate training. These include pain

management, opioid dependence, obesity, pharmacy law, and others. Additionally, topics that already are available as a shared curriculum would benefit from being evaluated using the RE-AIM model as an approach to optimize the development and dissemination of educational endeavors. According to the results from Study #2, the following four topics were identified as having the greatest potential benefits, should a shared curriculum be developed: opioid dependence, drugs of abuse, medical marijuana, and motivational interviewing. The study provides key recommendations for consideration in the development of shared curricula in the future. Future program developers and shared curricula creators are advised to consider these key recommendations for best chances of success in the long-term.

5.4 Other shared curricula with available websites

As noted above, a few shared curricula on other topics currently exist and have been utilized within the profession of pharmacy. Pharmacogenomics education program (PharmGenEd™) is hosted at www.pharmacogenomics.ucsd.edu, which is targeted to health professionals and students.[39] The PharmGenEd program provides an evidence-based curriculum to address pharmacogenomics concepts and clinical applications. Registration is not required, and access is granted to any user at no cost. Content is delivered via videos and handouts, and the modules include: principles and concepts of pharmacogenomics, clinical applications of pharmacogenomics, asthma, cardiology, diabetes, HIV/AIDS, oncology, psychiatry, and toxicogenomics. After each module, users are requested to complete a survey, which assesses several key constructs such as users' competence before and after completing the module, users' ability to apply the information in a clinical setting to benefit patients' health, and usefulness and quality of the educational materials. The authors of the pharmacogenomics curriculum conducted a train-the-trainer program, through which 58 pharmacy faculty members participated.[51] The impact of the train-the-trainer program on faculty has been evaluated,[51] as well as students who were taught the material after implementing the curriculum.[77] However, a website utilization study has not been conducted and the content appears to be outdated.

The infectious diseases educator network (ID-EN), https://iden.ucsf.edu/,[41] provides educational materials and resources to current practitioners and residents. The purpose of the website is to: (1) share information among infectious diseases educators, (2) provide best practices and resources, and (3) encourage collaboration on relevant projects. Registration is required, and

access is granted only to clinicians, educators, and researchers. No cost is associated with registration. To our knowledge, authors of ID-EN have not published a description of their website utilization.

The DM Educate program is a comprehensive diabetes management course, available online at dmeducatece.cecity.com. It is, however, not a free resource and new registrations are no longer available. Existing modules expired on April 17, 2020. The developers of DM Educate have evaluated the impact of the course on students' knowledge about diabetes,[78] students' satisfaction with the website's design,[87] and educators' satisfaction with the website's content.[88] Information about the extent to which the website was utilized is not published.

5.5 Limitations

An inherent limitation of parts of this line of research is self-reported measures, however, the use of mixed-methodology strengthens the study and provides a more robust evaluation. Another limitation is the lack of a control group in Study 1, although a one-group cohort is a common study design for educational programs—in a recent systematic review of medical faculty training programs, it was reported that the majority of studies do not include a control group.[48] Additionally, because participants were interviewed and surveyed 15 years after their workshop training, it is likely that they had forgotten some aspects of the program. Furthermore, because of the long duration of time elapsed, 26.3% of the Rx for Change trainee cohort was not locatable. However, of those who were located and were invited, 81.0% completed a survey and this is a respectable response rate given the nature of the target population.[63]

Because of the scope of the dissertation, and the long-term nature of the design, we were unable to compare characteristics of institutions that used the Rx for Change program to its fullest extent versus those who did not use the program. Such evaluation would provide additional evidence to characterize its long-term effect as well as identify predictors of program adoption and ongoing program use.

5.6 Next steps

A critical long-term goal for research is to contribute towards substantial improvements of health and educational systems. Therefore, future research should focus in the area of enhancing

pharmacy services and optimizing provision of patient care, through training and supporting pharmacists and educators. The Rx for Change curriculum and associated training have established a long-term impact on educators,[35,63] health professionals,[69] students,[32] as well as patients.[67,68] Content experts are invited to consider replicating the successful Rx for Change experience by developing new shared curricula in other topics of public health importance. Our findings indicate a general interest for and perceived benefit from creating shared curricula in opioids, drugs of abuse, medical marijuana, motivational interviewing, pain management, alcohol abuse, obesity, and law/jurisprudence.

With respect to tobacco cessation, a logical next step for this line of research is to enhance the role of pharmacy in filling gaps in care. Because pharmacists in many states now have authority to prescribe tobacco cessation medications,[12] training pharmacy faculty, pharmacy preceptors, and pharmacy students is necessary to ensure a skilled generation of pharmacists who are prepared to practice at the "top of their license" with respect to tobacco cessation. As of 2020, 12 states either currently allow or are actively engaging in steps to permit autonomous models of prescribing cessation medications through independent prescribing (Idaho) or statewide protocols (the other 11 states).[89] Pharmacists' ability to provide these clinical interventions expands and provides all tobacco users with nearly immediate access to cessation medications, which is considered "critical" according to the 2020 Report of the U.S. Surgeon General.[8] The Surgeon General's report also emphasized that all health professionals should engage by providing cessation interventions. In healthcare settings, health professionals from different disciplines work together to provide optimal patient care. Because provision of tobacco cessation interventions from more than one type of health professional has been shown to increase quit rates,[1] it is therefore important to address interprofessional collaboration as part of tobacco cessation training. Thus, a new Rx for Change training that aims to enhance skills for exercising prescriptive authority and interprofessional collaboration would be an important future endeavor.

In the past, several investigations have determined that pharmacists are effective in helping patients quit smoking[90-98]—however, they did not evaluate this impact among pharmacists who had the capacity to prescribe all of the tobacco cessation medications. An exception to this are studies conducted in the State of New Mexico, where pharmacists have had prescriptive authorities for cessation medications under a statewide protocol since 2004. In these studies, the 6-month quit rates were estimated at 18%[68] to 25%,[67] which is comparable to other interventions. Over a period

of seven years, the most commonly prescribed medication was nicotine replacement therapy (38.4%) followed by varenicline (30.7%) and combination therapy (4.8%). Importantly, more than one third of patients assisted were non-white, and 53% did not have health insurance.[68] As legislation continues to advance across the country, it will be important to replicate these studies as well as attempt to understand the barriers and facilitators to integrating pharmacist-delivered tobacco cessation services across a variety of practice settings. Additionally, studies are needed to evaluate the extent to which pharmacists with prescriptive authority for tobacco cessation medications refer patients to the tobacco quitline for additional assistance with quitting.[99]

CHAPTER 6. CONCLUSION

The Rx for Change curriculum content has been updated at least annually for the last two decades. It has been widely disseminated to multi-disciplinary health professional programs, as evident by the data collected and analyzed from the Rx for Change website. The program has also shown to be useful for educators, clinicians, and learners. To further disseminate the Rx for Change program to colleges/schools or pharmacy, a plethora of ideas were suggested by faculty members who participated in the Rx for Change workshops and completed a survey for Study 1. Ideas include conducting on-demand web-based training, sessions during professional meetings, live on-site training, and live webinars. Rx for Change trainees have also rated the importance of potential methods for further advancing the role of pharmacy in tobacco cessation, such as including tobacco cessation content in core curriculum of pharmacy schools, assigning rotation students to provide tobacco cessation counseling, including tobacco-related questions in the national examination bank of items, partnering with State Departments of Health and tobacco quitlines, providing free continuing education programs, and providing 'booster' trainings for students prior to rotations. One or more of the suggested ideas are opportunities for future researchers and program developers.

APPENDIX A. SURVEY

1. Consent form will be pasted here: (I agree; I decline)

2. Please provide your reason(s) for not participating in this survey: _____

3.1 Please rate the extent to which participation in the Rx for Change train-the-trainer workshop impacted your career in general. (Not at all impactful; a little impactful; moderately impactful; very impactful; extremely impactful)

3.2. How important were each of the following in your decision to **attend** an Rx for Change train-the-trainer workshop between 2003 and 2005? (Not at all important, a little important, moderately important, very important, extremely important, I do not recall)

a. It was required or encouraged by my university administration
b. It was encouraged by a mentor or colleague
c. To improve the tobacco content in our curriculum
d. To improve my teaching for tobacco cessation
e. To improve my skills for treating tobacco use and dependence
f. To be a part of this national training initiative
g. An opportunity to meet colleagues with similar interests
h. An opportunity to travel to San Francisco at no cost

3.3. Please list other reasons not listed above: _____

3.4. Please rate each of the following characteristics of the Rx for Change curriculum: (none, low, moderate, high, not applicable, I do not recall)

a. Compatibility for integration into your existing curriculum structure
b. Simplicity of implementing Rx for Change
c. Comprehensiveness of content
d. Appropriateness of teaching methodologies used

e. Relative advantage over other tobacco cessation content that is available elsewhere or developed internally at your school of pharmacy.

3.5. Over the past five years, how frequently did you log into the Rx for Change website? For https://rxforchange.ucsf.edu/

- Never
- Less than once a year
- About once a year
- About 2 to 10 times a year
- More than 10 times a year
- I have used the website in the past, but no longer do *because* I do not currently teach Rx for Change

Display 3.6 IF 3.5 is NOT = "Never"

3.6. How would you describe the usefulness of the Rx for Change web-site for supporting teaching of tobacco cessation? (https://rxforchange.ucsf.edu)

- Not at all useful
- A little useful
- Moderately useful
- Very useful
- Extremely useful
- I do not recall

3.7. Since participating in the train-the-trainer workshop, have you … (Yes, No)

a. Advised other **pharmacy** faculty members to consider adopting Rx for Change at their institution?
b. Advised **non-pharmacy** faculty members at other health professional schools to consider adopting Rx for Change at their institution?

3.8. In your opinion, how **effective** would the following strategies be in further disseminating Rx for Change to the newer colleges/schools of pharmacy? (not at all effective, a little effective, moderately effective, very effective, extremely effective, no opinion)

a. Conduct more live, on-site train-the-trainer workshops, similar to the San Francisco workshop
b. Conduct "live" web-based trainings or webinars
c. Conduct a 1-day session before an AACP or other professional meeting
d. Provide enduring on-demand web-based train-the-trainer programs that can be accessed at any time

3.9. Please rate how **important** the following are for advancing the role of pharmacy in tobacco cessation: (not at all important, a little important, moderately important, very important, extremely important, no opinion)

a. Include tobacco content in the core curriculum of <u>all</u> pharmacy schools
b. Include tobacco-related questions on the NAPLEX
c. Have students apply tobacco cessation counseling skills during IPPE/APPE rotations
d. Provide a web-based "booster" training for students to complete, prior to APPE
e. Provide a train-the-trainer program for faculty with free CE (live or online)
f. Partner with State Departments of Health
g. Partner with tobacco quitlines

3.10. If a pre-APPE web-based "booster" training for tobacco cessation was created for shared national use, how many hours/minutes of training do you think would be appropriate for students? 30 min, 1 hour, 90 min, 2 hours, other (please specify); I have no opinion

3.11. In your history of teaching **tobacco cessation** (in any institution where you have worked), which of the following approaches have you used? Select all that apply

a. Taught tobacco lectures in the classroom
b. Taught pharmacy practice laboratories/workshops for students (e.g., role playing with case studies or hands-on use of medications for cessation)
c. Served as an IPPE or APPE preceptor for students in a clinical setting where patients receive tobacco cessation counseling
d. Taught continuing education programs
e. Facilitated group tobacco cessation programs for patients
f. Created web-based lectures/podcasts for students to view prior to classroom instruction (e.g., flipped classroom technique)
g. Other (please describe):

3.12. Since participation in an Rx for Change train-the-trainer workshop (in 2003-2005), with which of the following have you been involved? Select all that apply

a. Increased the number of hours of tobacco cessation content that pharmacy students receive in the core curriculum
b. Added a new tobacco-related skills/practice lab activity
c. Developed a tobacco cessation elective
d. Developed an inter-professional activity focused on tobacco
e. Implemented standardized patients for students to counsel *for practice* (i.e., not high stakes)
f. Implemented a tobacco-specific objective structured clinical examination (OSCE) *to formally evaluate students*
g. Delivered a tobacco cessation workshop or training for clinicians in practice
h. Conducted a research project related to tobacco
i. Other: _____

3.13. Please rate your current **confidence** for the following:

None; low; moderate; high.

a. Teaching tobacco cessation

b. Precepting IPPE/APPE students for tobacco cessation activities
c. Providing tobacco cessation counseling to patients

3.14. When you and/or your colleagues implemented (or attempted to implement) Rx for Change at any institution where you have worked, how challenging were the following? Not at all challenging, a little challenging, moderately challenging, very challenging, extremely challenging, I do not recall)

a. Time in the curriculum was limited
b. Personal time on my part to make changes in the curriculum
c. Number of students in my college/school of pharmacy
d. Ability to incorporate content using active learning
e. Scheduling among educators
f. Access to hands-on materials (patches, gum, nicotine inhalers, etc.)
g. Financial resources

Display 3.15 IF 3.14a = a little, moderately, very, extremely

3.15. How did you or your colleagues address limited time in the curriculum? Select all that apply

a. I gradually increased time in the curriculum over the years
b. I asked the curriculum committee to increase curricular time
c. I developed an elective course for tobacco cessation to cover more material
d. I prioritized specific content to fit the number of hours I was allowed
e. Students were assigned content/materials to read or view outside of class
f. Tobacco material is/was taught to students via online instruction only
g. Other, please specify: _____
h. I did not do anything about it

3.16. In your opinion, to what extent does participation in the Rx for Change training impact **students'**…(Not at all impactful; slightly impactful; moderately impactful; very impactful; extremely impactful; No opinion)

a. **Competency** for tobacco cessation counseling

b. **Confidence** for tobacco cessation counseling
c. **Readiness** to apply their knowledge in practice

3.17. In your opinion, how useful would it be to have access to a shared curriculum on the following topics? (not at all useful, a little useful, moderately useful, very useful, extremely useful)

a. Opioid dependence
b. Drugs of abuse (including but not limited to opioids)
c. Alcohol abuse
d. Obesity
e. Medical marijuana
f. Motivational interviewing
g. Pain management
h. Law/Jurisprudence

3.18. Please list other topics not listed above: _____

3.19. Which of the following describes your *current* employment? Select all that apply

a. University institution: Pharmacy school – to block 4, then 6
b. University institution: Non-pharmacy school – to block 4, then 6 (PLEASE DESIGNATE DISCIPLINE)
c. Practice site where you provide care to patients – to block 5, then 6 *(treats patients)*
d. Retired, not providing care to patients – to block 6 *(not treating patients)*
e. Other position, not providing care to patients. Please describe: _____ – to block 6

BLOCK 4: FOR FOLKS IN ACADEMIA…

4.1. Do **you** currently teach tobacco cessation at your institution?

- Yes
- No

4.2. To what extent is the Rx for Change curriculum used at your current institution?

- All of it, or almost all of it
- Most of it
- Some of it
- None
- I do not know

4.3. Approximately how many hours of tobacco cessation material do your students **currently** receive, across the required didactic PharmD curriculum (including lecture, practice laboratories, web-based assignments, etc.)?

- None
- Less than 1 hour
- 1 to < 4 hours
- 4 to < 6 hours
- 6 to < 8 hours
- 8 to < 10 hours
- 10 or more hours
- I do not know

4.4. Please describe how the hours were divided – e.g., one 6-hr session, three 2-hr sessions, three 1-hr sessions plus one 2-hr workshop/lab, 2-hour pre-class assignment, etc.

Free text response:

_____

4.5. What is the likelihood that Rx for Change will be used to teach tobacco cessation at your pharmacy school during academic year 2019-2020? (Not at all likely, a little likely, moderately likely, very likely, extremely likely, I do not know)

4.6. Please indicate your level of agreement with the following statements: (Strongly disagree, disagree, neutral, agree, strongly agree)

a. Shared curricula (in general) should be more broadly considered for use in pharmacy schools
b. Shared curricula (in general) are a cost-effective approach to teaching
c. Availability of a shared curriculum limits creativity
d. Availability of a shared curriculum limits academic freedom
e. Availability of a shared curriculum limits the feeling of "ownership"

4.7. Tobacco-specific virtual patients and standardized patient/OSCE cases have recently been developed. Would you (or someone at your institution) be interested in receiving more information about these free resources, for use with your students?

- Yes
- No
- Not sure

Display 4.8 IF 4.7 = Yes

4.8. Who, at your school, would you recommend that we contact about providing these resources? [Free text_____]

4.9 What is your *current* position at your institution? Select all that apply

a. Assistant professor
b. Associate professor
c. Full professor
d. Department Head/Chair
e. Assistant/Associate Dean
f. Dean
g. Other, please specify: _____

BLOCK 5: FOR FOLKS IN PRACTICE…

5.1. In your current patient-care setting, how frequently do you **ask** your patients whether they use tobacco products?

- I ask all/almost all patients
- I ask patients approximately half of the time
- I ask patients only occasionally
- I rarely ask patients
- I never ask patients
- I don't personally provide care to patients == SKIP OUT

5.2. In your patient-care setting, which of the following do you use when assisting tobacco users with quitting? Select all that apply

a. The 5 A's (Ask, Advise, Assess, Assist, Arrange)
b. Brief counseling: Ask, Advise, and Refer (e.g., to the tobacco quitline, web-based resources)
c. Provide tobacco quitline cards/phone number
d. Apply motivational interviewing techniques
e. Address the 5 R's for those not ready to quit (Relevance, Risks, Rewards, Roadblocks, Repetition)
f. Check potential smoking-drug interactions when filling prescriptions
g. Other, please explain: _____
h. I do not assist patients with quitting

BLOCK 6 FOR EVERYONE WHO COMPLETED THE SURVEY

6.1. Thank you for completing this survey. Please provide your name and e-mail address.

6.2. Your name: _____

6.3. Your e-mail address: _____

6.4. Please provide us with an alternate e-mail address in case the gift card does not reach you via your primary e-mail (University SPAM blockers are problematic sometimes):

_____

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