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Rashmi Vyas, Anand Zachariah, Isobel Swamidasan, Priya Doris & Ilene Harris

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## WEB PAPER

# Integration of academic learning and service development through guided projects for rural practitioners in India

RASHMI VYAS, ANAND ZACHARIAH, ISOBEL SWAMIDASAN, PRIYA DORIS & ILENE HARRIS  
Christian Medical College, India

## Abstract

**Background:** Christian Medical College Vellore (CMC) aspired through its Fellowship in Secondary Hospital Medicine (FSHM), a 1-year distance-learning program, to integrate academic learning and service development through guided projects for junior doctors working in small rural hospitals.

**Aim:** The purpose of this article is to report the evaluation of the effectiveness of the project work in the FSHM program.

**Method:** Mixed method evaluation was done using focus group discussion with students, written surveys for students and faculty, and telephone interviews with students and medical superintendents. Evidence for validity was gathered for the written survey. Criteria for trustworthiness were applied for the qualitative data analysis.

**Results:** The major strengths of the project work identified were that students became aware of local health problems and how to deal with them, learned to work as a team, and had a sense of doing something useful. Recommendations for improvement were to have more interactions between guides and students. The benefits of projects to the hospital were providing improved clinical care, improved health systems, cost effective care management and benefits to the community.

**Conclusions:** Service learning through guided project work should be incorporated into distance-learning educational programs for junior doctors working in rural hospitals.

## Introduction

Service learning projects have been used, globally, in medical education to help students translate their academic efforts into medical and community practice (Elam et al. 2003; Averill et al. 2007; Borges & Hartung 2007). Such projects have been reported to result in significant improvements in students' attitudes, knowledge and skills related to community health, resources and service (Borges & Hartung 2007). Service learning is recognized as a pedagogy that links academic experience with community service (Averill et al. 2007). It has been shown to be beneficial both for learners as well as the communities (Elam et al. 2003; Averill et al. 2007; Borges & Hartung 2007).

Christian Medical College Vellore (CMC) aspired, through its Fellowship in Secondary Hospital Medicine (FSHM) program, to integrate academic learning and service development through guided projects for junior doctors working in small rural hospitals. The FSHM program utilizes service learning as a teaching–learning tool to link academic experience with community service. Although there are reports in the literature of incorporating service learning projects in undergraduate medical education (Elam et al. 2003; Averill et al. 2007; Borges & Hartung 2007), there are no reports on education programs that use service development projects for junior doctors working in rural hospitals. The purpose of this article is to report the evaluation of the FSHM program, with a focus on whether it

## Practice points

- Integrating academic learning with service development through guided projects is an effective teaching–learning tool providing benefits to students and community.
- Mixed method evaluation is a useful evaluation methodology.
- Application of criteria for trustworthiness enhances methodological rigor for qualitative data analysis.
- Medical colleges should incorporate projects into educational distance-learning programs to support doctors in rural hospitals.

achieved integration of academic learning and service development through guided project work for junior doctors working in rural hospitals in India. The evaluation was also designed to identify the benefits of community project work to the students and the hospitals. We first provide a brief overview of the FSHM program and the context in which it was designed, followed by a description of the design of the project work.

## Fellowship in secondary hospital medicine

CMC is a tertiary care center and its graduates have a service obligation of working for 2 years in secondary hospitals.

*Correspondence:* R. Vyas, Medical Education Unit, Christian Medical College, Vellore 632002, Tamil Nadu, India. Tel: 91 416 2284421; fax: 91 416 2262788; email: rashmivyas@yahoo.co.in; rashmivyas@cmcvellore.ac.in

which are typically small hospitals in rural areas. Graduates face many challenges while working in these smaller hospitals, including the type of cases they see which are different from those seen in the tertiary care center (Curran & Rourke 2004; Wilson et al. 2009); limited investigations and referral facilities; and academic and social isolation. Thus, most graduates do not choose to work in these hospitals after the service obligation (Zachariah 2000; Mullan 2006), as a result of which many such small hospitals are closing down (Zachariah 2000; Mullan 2006). This situation is affecting the health care of the nation, especially in rural areas, where many such hospitals are located. Globally, there is a shortage of health professionals in rural areas (Pathman et al. 1994; Wilson et al. 2009). Providing rural practitioners with academic and social support contributes to the retention of a rural medical workforce (Pathman et al. 1994; Curran & Rourke 2004; Wilson et al. 2009).

The FSHM is a 1-year blended distance-learning and on-site program, designed and implemented by CMC, for its graduates working in smaller hospitals located in rural areas. The objectives of the FSHM program are to equip the graduates to practice effectively in these small hospitals and provide them with social and academic support, with the anticipated long-term outcome that the graduates will make working in smaller hospitals a career choice. The FSHM includes a combination of: 15 paper-based distance-learning modules, which focus on providing academic resources for practicing in these smaller hospitals; 3 contact sessions spread across the year, which focus on helping students develop skills to practice in these hospitals, and encouraging networking; guided community project work with a focus on promoting service development and improving local health services; and networking with peers and faculty through telephone, e-mail, google group and contact sessions.

## Project work in the FSHM program

The purpose of the project work in the FSHM program was to improve student skills in research and implementing a project, promote service development and improve community health services. The FSHM students were encouraged to study a local health situation or improve local health services through guided projects. They presented an outline of the project work in their application for the FSHM program, after approval from the medical superintendent of the hospital where these students would be working. Once selected into the program, the graduates were assigned to a project guide from CMC, keeping in mind the FSHM student's preference, type of project and availability of the faculty member for project guidance. The students were also encouraged to have a local guide, wherever possible. The students and the guides interacted to refine the project proposal, which the student presented to the FSHM faculty and peers for feedback and suggestions during the first contact session, held at CMC for 6 days at the beginning of the program. Under the guidance of the CMC project guide, and the local guide wherever applicable, the student sent a written report of the final project proposal 4 months into the program. They then began to implement the project and sent an interim report midway

**Table 1.** Project topics of the students for the FSHM program for the years 2007–2008 and 2008–2009.

Project topics of the FSHM students for the year 2007–2008
Knowledge of and Attitude to Leprosy
A Descriptive Study of the Involvement of a Non Government Organization in National AIDS Control Program-III
Biomedical Waste Segregation and Disposal Management, Bishop Walsh Memorial Hospital, Thadagam
Evaluation of Knowledge and Treatment of Thalassemia Among the Patients Admitted in Mercy Mission Hospital, Kolkata for Blood Transfusion
Case Series in the Department of Emergency Medicine
Development of an Institutional Program to Enhance Antimicrobial Stewardship at CSI Hospital, Bangalore
To Start a Diabetic Clinic
To Increase the Level of Knowledge of Basic Life Support Among the Nursing Staff and Doctors
Determinants of Utilization of Antenatal Care Services Amongst Pregnant Women in Evangelical Hospital, Khariar
Term Eclampsia and Severe Pre-Eclampsia: A Retrospective Study in a Mission Hospital in Rural Central India
Teaching First Aid and Cardio Pulmonary Resuscitation to Nursing Assistants and a Group of Lay Persons
Project topics of the FSHM students for the year 2008–2009
Health Education for Schools
The Safety Profile of Tramadol in Labour
Cost Analysis of Minor Procedures
Improvement of the Existing District Microscopy Centre at Jalna Mission Hospital
An Overview of the Epidemiology of HIV in India and a Descriptive Analysis of HIV Interventions at the Grass Root Level
Evaluation of the MITRA Malnutrition Protocol
A Report on a Meningococcal Disease outbreak Based on Cases Presenting to KJP Assembly Hospital Jowai-Meghalaya
Starting Diabetic Clinic in the Community Health Centre of CSI Mission General Hospital, Tiruchirapalli
Cancer Care in a Secondary Hospital
Health Promotion in Children with Downs Syndrome
Study of Incidence of Meconium Stained Amniotic Fluid in a Secondary Hospital Set Up and their Neonatal Outcomes
Coronary Artery Disease – Primary Prevention
Health Program for Children Attending School at Dornakal Mission Compound
To Evaluate the Efficacy of Low Dose Ketamine in Providing Analgesia During Labor
A Study on Snake Bites
Labor Analgesia – Knowledge, Attitudes, Practices

through the program. They presented the interim report during the second contact session, held at CMC midway through the program, to FSHM faculty and peers for feedback and suggestions. The students submit their final project report towards the end of the program. They give a presentation of the final report during the third contact session, which is held at CMC for 3 days at the end of the FSHM program. The students are graded on the final project report and presentation on a checklist. Table 1 provides the topics of the students' projects.

Faculty development for project guidance was integral to the FSHM program and was held each year before the start of the program. Evaluation of the project work was conducted both for accountability and for improvement (Fitzpatrick et al. 2002).

## Evaluation methods

The FSHM students for 2007–2008 and 2008–2009, faculty members for the FSHM program, and medical superintendents

of the secondary hospitals where FSHM students were working, were included in the evaluation study. The evaluation was done after 2 years of implementation of the FSHM program.

### Written surveys

Two written surveys were administered, one to all FSHM students ( $n=16$ ) for 2008–2009 after they were awarded the fellowship and one to faculty (from CMC and secondary hospitals) ( $n=22$ ). The surveys included structured questions that yielded quantitative data as well as open-ended questions that yielded comments. The structured questions focused on rating the effectiveness of the project work as an instructional method for the FSHM course and in helping students develop knowledge about local health problems and skills to improve them. The open-ended questions were used to obtain views of students and faculty regarding strengths of the project work and recommendations for improvement.

### Focus group

One focus group was conducted with 2008–2009 students ( $n=7$ ) at the end of the program. The students were selected by the authors to represent genders, different hospitals and different states of the country.

### Interviews

Telephone interviews were conducted with FSHM students ( $n=22$ ) of the years 2007–2008 ( $n=16$ ) and 2008–2009 ( $n=6$ ); and with medical superintendents ( $n=8$ ) at smaller hospitals where FSHM students were working.

The purpose of the focus group and interviews were to explore further, through open-ended questions, the effectiveness of the project work and to collect qualitative data to provide a rich portrayal of the benefits of the project work and recommendations for change.

Quantitative data analysis was done using SPSS statistical software and is reported as frequency distributions. Qualitative data analysis was done using a grounded theory approach with constant comparative analysis, a process of reading and rereading the narrative data, developing themes in the process, and then reviewing previously read data to check the appropriateness of the themes developed (Harris 2002, 2003). Two of the authors independently analyzed the data. An inductive content analysis, which refers to the process of developing themes as one reads, of all comments was done. Themes in the comments were identified and coded, and comments assigned to themes. Inter-rater reliability of identified themes, and comments assigned to themes, was calculated using Miles and Huberman's formula (Miles & Huberman 1994) as follows:

$$\text{Reliability} = \frac{\text{number of agreements}}{\text{total number of agreements and disagreements}}$$

The following evidence for validity of surveys were gathered, based on the current usage of the term "validity," where all validity is construct validity (Downing 2003; Cook &

Beckman 2006; Vyas et al. 2009). Surveys were designed based on the purposes of the evaluation, to obtain views of students and faculty regarding the effectiveness of the project work for service learning. The purposes of the surveys were stated, and the questions were then framed in alignment with the objectives. Content experts reviewed the surveys to evaluate if the questions, as phrased, were appropriate to elicit desired perspectives and capture issues of concern. The faculty survey was pilot tested by five FSHM faculty who did not participate in the study. The student survey was pilot tested by five FSHM students who did not participate in the survey. During pilot testing, the authors went through surveys with subjects, responding to queries about what questions mean. Necessary modifications were made in the surveys based on feedback from pilot testers. The surveys were designed to make participants reflect on the project work and offer suggestions for improvement. Some suggestions were subsequently incorporated to improve the project work.

To ensure trustworthiness of the qualitative data analysis, criteria for trustworthiness recommended by Barzansky et al. (1985) were applied. Triangulation was achieved by collecting data from multiple sources, including students, faculty and medical superintendents; using multiple methods for data collection, including a focus group, surveys and interviews; and comparing themes among the different methods of data collection. Two faculty members for the FSHM program, and two FSHM students who participated in the evaluation study, did a member check to ensure that the themes captured all important issues. The qualitative data will be described in detail in the results section, with examples of quotes from study participants. Inter-rater reliability was 100% after discussion among reviewers. However, one of the authors was involved in the curriculum design, which may have brought potential bias into the evaluation. This was addressed by: (1) using multiple methods to check for trustworthiness and accuracy of data and (2) applying all criteria for trustworthiness, including triangulation, member check, thick description, audit trail and reflexivity (Barzansky et al. 1985).

## Results

All 16 students of the 2008–2009 class completed the survey (response rate 100%). Of the 22 faculty involved as project guides, 13 completed the survey (response rate 60%). Two authors who were reviewers for analysis of qualitative data had before discussion, 100% agreement for themes identified in the student focus group; 56% for student interviews; 89% for student surveys; 84% for faculty surveys; and 86% for medical superintendent interviews. Reviewers had the following agreement on comments assigned to themes, before discussion: 100% for the student focus group; 63% for student interviews; 91% for student surveys; 92% for faculty surveys; and 64% for medical superintendent interviews. After discussion between reviewers, 100% agreement was reached for themes and comments assigned to themes for all data.

All students and a great majority of faculty (70%) rated project work as Very Good/Excellent in helping students develop knowledge about local health problems. The vast majority of students (94%) rated project work as Very Good/

**Table 2.** Quantitative data of student and faculty responses to survey questions regarding effectiveness of project work in the FSHM program.

Effectiveness of project work (students $n = 16$ ; faculty $n = 13$ )													
Items	Student response % (n)						Faculty response % (n)						MS $\pm$ SD
	1	2	3	4	5	MS $\pm$ SD	1	2	3	4	5	MS $\pm$ SD	
As an instructional method for the FSHM course	–	6 (1)	31 (5)	31 (5)	31 (5)	3.9 $\pm$ 0.9	–	8 (1)	31 (4)	46 (6)	15 (2)	3.7 $\pm$ 0.9	
In helping students develop knowledge about local health problem	–	–	–	56 (9)	44 (7)	4.4 $\pm$ 0.5	–	–	31 (4)	39 (5)	31 (4)	4.0 $\pm$ 0.8	
In helping students to learn skills to improve the local health problem	–	–	6 (1)	56 (9)	38 (6)	4.3 $\pm$ 0.6	–	15 (2)	31 (4)	46 (6)	8 (1)	3.5 $\pm$ 0.8	
Mean effectiveness	–	–	31 (5)	50 (8)	19 (3)	4.2 $\pm$ 0.5	–	15 (20)	39 (5)	39 (5)	8 (1)	3.7 $\pm$ 0.7	

Notes: 1, poor; 2, fair; 3, good; 4, very good; and 5, excellent; values are mean score  $\pm$  standard deviation.

Excellent in helping them to develop skills to improve the local health problems while the great majority of faculty (77%) rated project work as Good/Very Good in helping students develop skills to improve the local health problems. The quantitative data regarding project work is presented in details in Table 2. The themes generated, with examples of comments from students, faculty and medical superintendents regarding project work are outlined below and presented in greater detail in a table available from the first author.

### Strengths of project work

Major themes generated were: Learned How to do Research and Implement a Project (student survey, 8/13; student focus group, 2/7; faculty survey, 8/13. Student comment: “It helped me find my way on how to do research including data entry and analysis.”; Faculty comment: “The students learn to do a study and analyze the results.”); Became Aware of Local Health Problems and How to Deal with Them (student survey, 8/13; student focus group, 2/7; faculty survey, 4/13. Student comment: “Became aware of economic issues faced by patients, such as cost of chemotherapy.”; Faculty comment: “Students came up with useful recommendations to improve health in the local area.”); Sense of Doing Something Useful (student survey, 1/13; faculty survey, 6/13. Student comment: “It was excellent as it made us do something worthwhile.”; Faculty comment: “It gives the students a sense of doing something useful during the two year period of working in the secondary hospital.”); Guidance by Faculty (student survey, 4/13; student focus group, 2/7; Student comment: “Freedom to choose the topic and continuous productive input from CMC faculty guide.”); Helped to Work as a Team (student survey, 3/13; student focus group, 2/7. Student comment: “Project work helped me to work as a team.”; “Made us interact much more with hospital staff and work together.”); and Helped to Keep in Touch with CMC (faculty survey, 1/13. “Helped the students to keep in touch with CMC and the faculty involved.”).

### Recommendations for improvement

Major themes identified for recommendations for improvement were: More Interaction Between Guide and Student

(student survey, 2/9; faculty survey, 3/9. Student comment: “More advice from guide regarding choice of projects.”; Faculty comment: “Ensure better interaction between student and guide.”); Choose Simple Feasible Project (student survey, 1/9; faculty survey, 2/9. Student comment: “Project should be simple and feasible.”; Faculty comment: “Project should be simple, applicable to area of work and feasible with minimal funds available.”); Prior Learning of Statistical Methods (student survey, 4/9. Comment: “Class on statistical analysis and research methodology prior to project work would be very useful.”); Organizational Matters (student focus group, 3/7; faculty survey, 1/9. Student comment: “If we need good projects we need time.”; Faculty comment: “CMC faculty should visit the secondary hospital and assess the project work at least once during the project time. A responsible faculty at the secondary hospitals should also be in charge of the project work.”).

### Challenges faced while doing project work

Major challenges faced by students during project work were: Lack of Time (student interview, 9/22; faculty survey, 3/13. Student comment: “In my hospital there are less number of doctors so I found it difficult to take time off to do the project.”; Faculty comment: “There was limited time available for project work.”); Lack of Administrative Support (student interview, 7/22; faculty survey, 3/13. Student comment: “Getting support from the administration was a challenge. They agreed to let me do the project but when it came to do it they said why do you want to do it.”; Faculty comment: “The challenge was to get the support from the local hospital administration.”); Lack of Support from Colleagues (student interview, 6/22; faculty survey, 1/13. Student comment: “When I wanted to start a diabetic clinic in the main hospital other physicians did not agree as they did not want to loose patients.”; Faculty comment: “Challenge was getting cooperation from other faculty in the secondary hospital.”); Choosing the Right Project (student interview, 10/22; faculty survey, 3/13. Student comment: “Main challenge was what to do, getting it started, finding the right question and tailoring it to a situation.”; Faculty comment: “Students need mentoring for choosing the right project.”); Motivation (student interview, 1/22; faculty survey, 2/13. Student comment: “Challenge was to get



over my inertia and be motivated to do the project.”; Faculty comment: “To some extent the challenge was motivational.”); Implementation (student interview, 6/22. Comment: “Mine was an observational study and developing a protocol. The challenge was in implementation as the protocol I designed was not the practice in the hospital.”); “Much of the challenge was in collecting the data. I was very busy so I had other people to do data collection but then I had to wait for them to collect the data.”); Difficulty in Data Entry and Data Analysis (student interview, 2/22. Comment: “Data analysis was difficult.”).

The major challenge faced by the project guides was in Regular Communication with Students (faculty survey, 6/10. Comment: “Keeping in touch regularly with the student.”); Guidance in Choice of Project (faculty survey, 2/10. Comment: “Understanding what would be appropriate for a project for the student without being fully familiar with the student’s hospital.”); and Getting Administrative Support (faculty survey, 1/10. Comment: “I had to negotiate with the authorities in the student’s hospital.”).

#### How were challenges overcome

Main themes identified regarding how challenges were overcome were: Modification of Project (student interview, 10/22; faculty survey, 2/12. Student comment: “As I was not able to start the diabetic clinic in the main hospital as originally planned, I started it in the peripheral clinic.”; Faculty comment: “Changed the project into simpler one.”); Effective Time Management (student interview, 9/22; faculty survey, 2/12. Student comment: “Instead of looking at it as a major project, I started asking myself what I can do to help patients which helped me to plan and overcome the lack of time.”; Faculty comment: “Started setting deadlines with a regular time for data collection.”); Frequent Discussion with Project Guide (student interview, 5/22; faculty survey, 5/12. Student comment: “I had frequent discussion with my project guide who gave me a lot of freedom, encouraging me to keep it simple.”; Faculty comment: “Frequent discussion with the student.”); Winning the Trust and Support of Administration and Colleagues (student interview, 17/22; faculty survey, 2/12. Student comment: “Initially the administration was not keen, but when I explained that the project would support the hospital staff they were okay with it.”; “I kept on explaining my project again and again to my colleagues till they agreed.”; Faculty comment: “Identifying resource persons at the secondary hospital site and taking their help to win administrative support.”); Demonstrated Outcomes Through Practice (student interview, 4/22. Comment: “I started doing the Lumbar Puncture which was not done in my hospital earlier and showed the benefits in diagnosis. Now all the doctors in my Hospital are doing Lumbar Puncture.”); and Took Expert Help (student interview, 4/22. Comment: “I took help from a statistician outside the hospital.”).

#### Benefits of project to hospital

Major themes identified regarding benefits of the project to the hospital were: Improved Clinical Care (student interview,

12/22; faculty survey, 2/22; medical superintendent interview, 4/8. Student comment: “My project has shown that more than 95% of meconium stained babies can be managed at secondary hospitals. Now unless the babies develop complications we are not referring them. The whole attitude and treatment of meconium stained babies has changed. Doctors in my hospital are much more confident in managing them.”; Faculty comment: “The first project on labor analgesia will help the hospitals to provide a safe and cheap mode of labor analgesia.”; Medical superintendent comment: “Patient and Hospital benefited by follow-up and management of cancer patients.”); Improved Health Systems in Hospital (student interview, 3/22; faculty survey, 3/13; medical superintendent interview, 2/8. Student comment: “Waste disposal in my hospital was totally unhygienic. After my project we, including the staff and the attenders, started taking more precautions in disposing off waste.”; Faculty comment: “Through this project the hospital has an improved blood donor base.”; Medical superintendent comment: “We have many cases of meningococcal disease. We improved our laboratory services after the project.”); Providing Benefits to the Community (student interview, 14/22; faculty survey, 1/13; medical superintendent interview, 2/8. Student comment: “The evaluation of the protocol for malnutrition has greatly helped the community.”; Medical superintendent comment: “More useful to the community. Personal follow up of the patient in the community has become much better. Other consultants have also joined in now.”); Development of New Programs (faculty survey, 5/13. Faculty comment: “May help give birth to new programs that were needed but there was no one to drive it.”); Evaluate Programs (faculty survey, 4/13. Comment: “The project may help the hospital to formally evaluate a program.”); Provided New Learning (student interview, 6/22. Comment: “It benefited me. My understanding of HIV patients has improved drastically.”).

In addition, students were asked in their focus group to discuss specific incidents regarding their project work in helping them to become aware of local health problems. All seven focus group participants said that it helped them to become aware of local health problems. These problems included: the need for health programs for school children; economic problems faced by cancer patients regarding chemotherapy and regular follow-up; diseases specific to certain areas, such as a high incidence of meningococcal infections and malaria in the North Eastern part of India; lack of knowledge among hospital staff about the cost of minor procedures; misconceptions among hospital staff and faculty regarding side effects of Tramadol in causing respiratory distress in babies when given to term pregnant women; and attitudes of pregnant women and their relatives about benefits of labor analgesia and hence their resistance to receive labor analgesia.

Students were also asked in the focus group to describe specific incidents of how the project work helped them to work as members of a team. All participants said that it helped them to realize the importance of teamwork and of working in a team, along with nurses, lab technicians, physiotherapists and attenders. They received help from staff in data collection and implementation of protocols.

## Discussion

The data provided is preliminary data as the program had been running for 2 years when the evaluation study was done. However, this evaluation study provides evidence that the FSHM program achieved integration of academic learning and service development through guided project work for junior doctors working in rural hospitals in India. Doing the project work has provided benefits to the students who learned how to do a project, work as a team, become aware of local health problems and offer solutions to address these problems. In addition, the project work has provided benefits to the hospitals by improving clinical care, improving health systems in the hospital, and providing cost effective management and benefits to the community.

A project allows learners to identify and formulate their own problems, set goals and make unexpected discoveries (Schneider et al. 2010). Project-based learning promotes self-directed learning and engagement in the complex process of inquiry and design (Natarajan 2005). This is reflected in our study as the students identify a local health or service development need and design a project around it. The use of project enabled the FSHM students to translate their learning into practical improvements in care, provided training in organizing and improving hospital systems and sensitized them to the opportunities of research and project work in rural areas outside the academic setting.

There were challenges faced by the students in doing the project work, but they learned to overcome the challenges and in the process learned to work in a team, learned to manage time effectively, and learned the skills to win support from administration and colleagues.

On the whole, the evaluation data demonstrated many strengths of project work, but also included suggestions for improvement as follows: more interaction between guide and students, choosing a simple feasible project, and the need for prior learning of statistical methods.

Based on the suggestions, the involvement of the project guides now begin even before the students come for the first contact session to CMC, so that the students can be guided as they do the needs assessment and choose a relevant feasible project. The students and the project guides are provided with each other's contact details and are encouraged to interact through telephone or e-mail. In addition, the FSHM program has been created on e-learning, CMCs learning management system through which the students and project guide can interact more frequently. The students are actively helped to identify a local guide and make use of their help. Project guides are encouraged to visit the students' hospital at least once to further support the student, lend their expertise to the hospital and learn from the hospital's faculty. The e-learning is currently being developed for mobile phone use and being pilot tested by FSHM students to enable them to enhance their interaction with the project guides (Vyas et al. 2010). Sessions on statistical methods and questionnaire design have been included in the second contact session.

A limitation of this study is that evaluation of outcomes is based on self-reports by students, faculty and

medical superintendents. Nevertheless, this study reflects the perspectives of three groups – students, faculty and medical superintendents, using multiple methods of data collection, with consistent results among the three groups and data collection methods. Further research is required to evaluate the benefits of the project work by including the perspectives of the patients and the community. This program may not be applicable at all schools. For example, the program may have been effective for the graduates of CMC because of the service orientation of students who attend that school. Since then the program has been expanded to include graduates from other medical colleges working in smaller hospitals. Further research is required to evaluate the effectiveness of the project work by the students of the FSHM program who were not graduates from CMC.

Project work has been used for undergraduate medical education (Elam et al. 2003; Averill et al. 2007; Borges & Hartung 2007; Vaidya & Gothankar 2009) and for residency training (Ogrinc et al. 2004) as a service teaching learning tool. The project work has had benefits to the learner (Elam et al. 2003; Averill et al. 2007; Borges & Hartung 2007) as well as to the community (Olivier et al. 2007). Our study confirms that there are specific benefits of the project work to the learner, such as learning to do a project, and awareness of local health problems and how to deal with them; as well as to the hospital and the community, such as improved clinical care, improved health systems in the hospital, and providing cost effective management.

We would thus suggest expanding the use of project work beyond undergraduates and residents as a teaching-learning tool for junior doctors working in rural hospitals.

Project work has been suggested for web-based learning (McKimm et al. 2003) and as a teaching-learning tool for distance education (Natarajan 2005). This study demonstrates the effectiveness of guided project work as a teaching-learning tool for the FSHM, a distance-learning program. Medical colleges should therefore consider incorporating project work into educational distance-learning programs for supporting junior doctors working in rural hospitals.

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**Declaration of interest:** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

## Notes on contributors

RASHMI VYAS, MBBS, MD, MHPE is a professor in the Department of Physiology and Core Educator in medical education at Christian Medical College, Vellore. She is FAIMER (Foundation for Advancement of International Medical Education and Research), Philadelphia fellow in medical education and has been awarded the Masters in Health Professions Education degree from UIC, Chicago.

ANAND ZACHARIAH, MBBS, MD, is a professor in the Department of Medicine and was Vice Principal at Christian Medical College, Vellore. He is the co-course organizer for the FSHM program.

ISOBEL SWAMIDASAN, MA, is the editor for Distance Education programs run by Christian Medical College, Vellore. She is the editor for the distance education modules for the FSHM program.

PRIYA DORIS, MSW, is the Associate Research Officer at Christian Medical College, Vellore. She is the project coordinator for the FSHM program.

ILENE HARRIS, PhD, is a professor, Head and Director of Graduate Studies in Health Professions Education Leadership in the Department of Medical Education at the University of Illinois, College of Medicine in Chicago.

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