The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

SUMMATIVE PROJECT EVALUATION REPORT

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Executive Summary

Supported by the Western Australia Premier's Science and Innovation Council, the former Labour Government's peak advisory body on the strategic direction of science initiatives for WA, and funded by the WA Department of Industry and Resources (DoIR), the **Pilot Mentoring Program for Beginner Science and Mathematics Teachers** has been a 7-month pilot project located and managed at the University of Western Australia (UWA). This pilot mentoring program involved UWA's Centre for Learning Technology and Graduate School of Education staff in a project management team, and mentor and mentee science and maths teachers drawn from Government, Catholic and Independent school sectors across WA. The proximate aim of the pilot mentoring program was to improve the induction experiences of a select group of WA's graduate teachers in secondary science and mathematics, through professional development and sustained one-on-one mentoring. The ultimate goal of the pilot program was to enhance the likelihood that these teachers would remain in their chosen professional and disciplinary contexts beyond the critical attrition period for teaching of 3 to 5 years.

Previous research and evaluation around mentoring new teachers would seem to strongly support the notion that the availability of a well-designed mentoring program can be a keystone aspect of improving the resiliency and retention of beginning science and maths teachers in the schools. This evaluation of the UWA/DoIR pilot program examines this notion of supporting beginning science and mathematics teachers through mentoring. It includes mentors' and mentees' expectations of the outcomes of participation in the program and their perceptions of the success of their mentoring relationships across the latter part of the 2008 school year. As well, this program evaluation provides examination and discussion of the actual outcomes that participants experienced as a result of their mentoring experiences as well as participants' views of what worked and what didn't, and their suggestions for future program enhancements.

The aims (explicit and implicit) of this *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* can be represented as follows:

1. To build and systematically test a model program for mentoring beginning science and maths teachers in WA, that would serve as an effective support for new teacher induction, and that would be scalable and sustainable in the longer term;

2. To develop a cadre of experienced science and maths teacher leaders in WA who together would provide professional induction support through one-to-one mentoring for graduate teachers in these perennially high-need learning areas;

3. Through a targeted mentoring program, to build the capacity of beginning science and maths teachers in WA through professional development and mentoring, and thereby enhance their resiliency and retention as new teachers within their disciplinary contexts.

The approach taken for the evaluation of the *Mentoring Program for Beginning Science & Maths Teachers* pilot project may be characterized as collaborative, outcomes-based, and mixed-method. Three key questions guided the pilot program evaluation:

1. To what degree was the pilot program implemented as planned?

2. To what degree did the project accomplish its goals and objectives (i.e. improvements in the capacity and resiliency of mentors and mentees and improvements in the likely retention of beginner science and maths teachers)?

3. To what degree can the work and achievements of the project be considered scalable and sustainable? That is, what features would be important for a scaled-up mentoring program for beginning science and maths teachers to be able to successfully "stand on its own feet" beyond the time span of external support?

With regard to the first question, the summative judgment reached—based on the data gathered over the life of the evaluation project—is that the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* has been implemented over its 7-month lifespan, by its management team, with a *high degree of fidelity* to its program plans, and as funded by DoIR. Recruitment of mentors and mentees, planning and delivery of professional development for mentees and mentors, and the monitoring and management of the pilot program and its participants were all accomplished with a high degree of fidelity and success. However, notwithstanding this successful implementation, only 9 of the 40 participating mentees received the 20% workload reduction that had been intended and funded as a keystone feature of the mentoring program; another 14 mentees varied in the amount of workload reduction afforded by their schools. The lack of school-provided workload reductions, as intended and funded by the program perhaps did have some impact on the pilot programs' outcomes (particularly with regard to the likely retention of these teachers in the profession). Most certainly, this serves as an additional reminder of how "close to the wind" many schools are forced to sail because of staffing constraints, and particularly so in the case of difficult to staff maths and science positions.

With regard to the second evaluation question, to what degree did the pilot mentoring program accomplish its goals and objectives; the accomplishments of the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* can be portrayed on at least two levels: first, at the level of capacity- and resiliency-building for new and experienced teachers (the participants); and second, in terms of the extent to which the program supported and/or enhanced the likely retention of participant mentees in the teaching profession. The summative judgment reached—based on the data gathered over the life of the project—is that the pilot mentoring program has achieved its intended goals with a *good degree of success*. Undoubtedly, at the first level, the mentoring experience resulting in multidimensional enhancements in the capacity of both mentees and mentors.

At the second level, the clear indication is that the program provided the support that was crucial in keeping some mentees from leaving teaching during their first year. On the question of enhancing the retention of this group of beginning science and maths teachers beyond the critical 3-year point, we cannot answer with certainty due to the short period of the project and its evaluation as well as the modest number of mentees who answered the post-program survey. However, the indications are good that the experience of the mentoring program has made positive differences in mentees' decision-making around staying in the teaching profession.

Finally, with regard to the apparent scalability of the pilot mentoring program, and its likely sustainability, the data gathered suggest that this program is highly scalable and its outcomes sustainable, *if the following program conditions and features can be provided and sustained absent external support* (i.e., through the commitment and support of the relevant school system authorities):

➢ Appropriate reduction in mentees' teaching workload (e.g., by 20%). This feature seemed widely accepted by both mentees and mentors as a keystone enabler of developing helpful mentoring relationships;

➢ Professional development on effective mentoring provided to both mentees and mentors. The literature points to many mentoring programs that trained only the mentors (e.g., Gagen & Bowie, 2005). However, this pilot mentoring program demonstrated that more effective relationships can be achieved if professionally delivered training is provided for both groups;

➢ Co-location of mentees and mentors in the same school, where possible. Based on participants' recommendations, future programs should avoid mentees and mentors located

in different schools as this provides a barrier to the timely development of mentoring relationships;

➢ Careful selection of mentors, with the possible use of the current cadre of mentors as leaders and/or trainers in this process. Both mentees and mentors agreed that the selection of appropriate/experienced mentors should be carefully done, with mentor selection perhaps based on their passion for teaching within science and mathematics;

➢ Recognition by key parties that content expertise in science and maths is not the only key to the successful and lasting induction of new teachers in the profession. The data gathered were clear in conveying the message that these new teachers most often needed support and guidance not in the content of their disciplines, but in the choice and appropriate use of instructional and assessment strategies, in coherently programming their work over extended periods of time, in the management of students' classroom behaviour and in successfully understanding and navigating unfamiliar school policies;

➢ Enhance school and teacher planning by beginning the mentoring program at the beginning of the academic year, with information about its availability widely advertised prior to the school year;

➢ Build in regular group milestone/checkpoint meetings throughout the school year. Such meetings can serve to enhance collegiality through the sharing of experiences and ideas. In addition, group milestone meetings can serve as a mechanism for enhancing accountability during the life of the program;

➢ Continue to systematically evaluate the program. There should continue to be a systematic evaluation of the program that would continue to provide mechanisms for timely feedback to the program's managers oriented toward program improvement. Equally, such systematic evaluation would provide periodic assurance for all stakeholders on the mentoring program's overall effectiveness.

Taken together therefore, our analysis of the varied sources of evidence gathered and aggregated through this program evaluation results in a clear conclusion. The 7-month ***Pilot Mentoring Program for Beginner Science and Mathematics Teachers*** was implemented with a high degree of fidelity to its funded plans, and has enjoyed a good degree of success with regard capacity-building for both mentees and mentors and enhancement of the likely retention of this cadre of beginning science and maths teachers in the teaching profession. Additionally, the pilot mentoring program appears highly scalable and its outcomes sustainable if appropriate conditions (especially workload reduction for new teachers) can be met by the key system stakeholders involved. Having heard the stories related by this cadre of new and experienced maths and science teachers—clearly the best of the profession that WA has to offer—such investment in the near-term induction of new teachers is likely to pay large dividends for WA's schools and students over the medium and longer terms.

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

S E C T I O N   1 .   I N T R O D U C T I O N

project summary

Supported by the Western Australia Premier's Science and Innovation Council (the former Labour Government's peak advisory body on the strategic direction of science initiatives for WA) and funded by the WA Department of Industry and Resources (DoIR), the **Pilot Mentoring Program for Beginner Science and Mathematics Teachers** has been a 7-month pilot project located and managed at the University of Western Australia (UWA). This pilot mentoring program involved UWA's Centre for Learning Technology and Graduate School of Education staff in a project management team, and mentor and mentee science and maths teachers drawn from Government, Catholic and Independent school sectors across WA. The proximate aim of the pilot mentoring program was to improve the induction experiences of a select group of WA's graduate teachers in secondary science and mathematics, through professional development and sustained one-on-one mentoring, with the ultimate goal of enhancing the likelihood that these teachers would remain in their chosen profession and disciplinary contexts beyond the typically critical attrition period of 3 to 5 years.

research underpinnings

The *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* was conceived and designed to avoid the initiation of new teachers into their professional lives via "sink or swim" first-year experiences. As emphasized in the literature, mentoring programs typically aim to play positive roles in the induction and retention of novice teachers in the teaching profession. Studies suggest that beginning teachers who were provided with mentors from the same subject area, and who participated in mentoring activities, were less likely to leave the profession and tended to stay at the same school. Thus, the literature supports the notion that there is considerable potential for well-designed mentoring to help bring about needed reform in the induction and retention of early-career teachers (e.g., Hudson & McRobbie, 2003; Smith & Ingersoll, 2004). Equally, the literature suggests that early-career mentoring can assist in developing the resiliency of graduate teachers to effectively deal with the challenges associated with beginning their professional careers (e.g., Bobek, 2002).

Thus, in general, mentoring has become a relatively widely used practice for helping new teachers in establishing their careers (Martinez, 2004; Schuck, 2005). A rich body of literature suggests that experienced teachers can provide novice teachers with guidance and support in learning new pedagogies and in socializing them into new professional norms (e.g., Shulman, 2004). Other studies (e.g., Gagen & Bowie, 2005) have been concerned with the roles of mentors and how mentor-training workshops could increase the number and quality of those mentors, but typically they have not examined the direct effects of these efforts on new teachers or their impact on new teacher retention.

From another perspective, MacCallum (2007) has examined conceptualization of the model of mentoring. The concept of mentoring can vary from a *traditional mentoring program* in which the mentoring relationship is determined mainly by the mentor, who provides advice and support to a new teacher. There is also a *partnership model* in which the mentoring relationship is based on mutual understanding of needs and support at a higher level of 'co-mentoring' (Mullen, 2000). Frequently, the first model includes training mainly of the mentors with little training to the mentees, whereas the second provides professional development for both mentors and mentees. In the partnership model, the mentor takes the facilitation role, but both partners participate in professional learning and

reflection processes. Clarke (2004) further expanded on this as he perceived three types of mentoring model: the formal/traditional in which there is mainly one-way communication from the mentor to the mentee; informal mentoring in which the information transfer or flow happens casually, and co-mentoring in which dialogue, featuring mutuality and reciprocity, takes place bi-directionally between the mentor and mentee.

The current pilot mentoring program did not predefine the conceptual model of mentoring. However, the inclusion and implementation of professional development workshops for both participating mentors and mentees did seem to lay the groundwork that facilitated bi-directional dialogue that in turn led to high levels of partnership in which relationships featured reciprocal benefits and promoted movement away from an expert-novice mentoring model toward a more collegial one.

Of particular relevance to this program is that new teachers in the learning areas of science and mathematics may indeed need stronger support because these teachers often face greater challenges in keeping up-to-date with new knowledge, innovative pedagogies and new technologies in addition to ensuring their early-career survival in the classroom. Science teachers in particular, tend to encounter a wide variety of tasks, have a greater number of preparations and more hands-on activities to prepare (Smith & Ingersoll, 2004). As noted in the literature, the mentoring experience may include discussions of recent changes in science and maths curricula, as well as innovative pedagogical practices and teaching strategies. Further, mentoring programs for beginning teachers can aim to strengthen participants' personal attributes, such as confidence and motivation, and support on-going participation in professional development. In addition, the mentor-mentee relationship should create a collegial relationship of trust and professionalism through good interpersonal communication.

Thus, previous research in this area would seem to strongly support the notion that the availability of a well-designed mentoring program can be a keystone aspect of improving the resiliency and retention of beginning science and maths teachers in the schools. This evaluation of the UWA/DoIR pilot program will examine many of these aspects of supporting beginning science and mathematics teachers through mentoring. It will include mentors' and mentees' expectations of the outcomes of participation in the program and their perceptions of the success of their mentoring relationships. As well, this program evaluation will examine the actual outcomes that participants experienced as a result of the mentoring experiences as well as participants' views of what worked and what didn't, and their suggestions for future program enhancements.

intended program outcomes

To provide an advance organizer, a list of the intended outcomes for the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* program is provided below. These targeted outcomes provided the guiding parameters for the planning and implementation of the pilot mentoring program, as well as its formative and summative evaluation.

The intended (implied) outcomes of *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* were:

1. To build and systematically test a model program for mentoring beginning science and maths teachers in WA, that would serve as an effective support for new teacher induction, and that would be scalable and sustainable in the longer term;

2. To develop a cadre of experienced science and maths teacher leaders in WA who together would provide professional induction support through one-to-one mentoring for graduate teachers in these perennially high-need learning areas;

3. Through a targeted mentoring program, to build the capacity of beginning science and maths teachers in WA through professional development and mentoring, and thereby enhance their resiliency and retention as new teachers within their disciplinary contexts.

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evaluation purpose, questions & structure

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The purpose of this program evaluation has been twofold. First, the evaluation served a formative (improvement-oriented) purpose in that it sought to provide a mechanism to monitor and review progress in relation to stated processes and outcomes at pivotal stages of the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers*. This purpose was primarily represented by the interim evaluation report provided to the mentoring program's steering group on September 1st 2008 (see Appendix 8).

Second, and of particular relevance to this report, the program evaluation provided a summative (accountability-oriented) appraisal of the pilot program that reviews its achievements against the stated aims of the *Mentoring Program for Beginner Science and Mathematics Teachers*.

Thus, the evaluation comprised both formative and summative purposes and activities that have been put together here to gauge the effectiveness of the project (i.e., the extent to which the pilot program's outcomes were achieved in terms of the program's aims), review strengths and areas for improvement in its operation, and estimate the sustainability of its design and processes for scaling up beyond the initial pilot program.

Given the formative and summative purposes noted above, three key questions guided the program evaluation:

1. To what degree was the pilot program implemented as planned?
2. To what degree did the project accomplish its goals and objectives (i.e. improvements in the capacity and resiliency of participants and improvements in the likely retention of beginner science and maths teachers)?
3. To what degree can the work and achievements of the program be considered scalable and sustainable? That is, in what form and to what degree is the work of the program likely to live on beyond the scale and time of externally-provided support for the pilot program?

In sum, this report primarily represents a summative, independent evaluation of UWA's *Pilot Mentoring Program for Beginner Science and Mathematics Teachers*, aligned against the stated and/or implied aims of the program.

This summative evaluation report is organized in four sections. This first section provides backdrop for the *Pilot Mentoring Program* and its evaluation, including brief overview descriptions of the pilot program and its intended outcomes, as well as this evaluation report.

The second (evaluation methods) describes the methods and types of data gathered that address the evaluation questions listed above. Data gathering methods included:

➢   *Observation* of professional development sessions and project meetings;
➢   *Surveys* of professional development and mentoring experiences (i.e., surveys to gauge mentors' and mentees' levels of satisfaction with the program of professional development provided, as well as their appraisals of their mentoring experiences);
➢   *Focus group interviews* (i.e., face-to-face interviews with a selection of mentors and mentees, both at the start of the pilot program and towards its end) to provide richer explanation of the mentees' and mentors' views on the pilot program and their mentoring experiences.

The third section (evaluation findings and discussion) comprises the aggregated results of data gathered and analyses conducted for this summative evaluation. The findings and discussion section

is presented in three parts (Program Implementation, Program Outcomes and Program Sustainability) organized around the three key evaluation questions noted above. Salient themes and outcomes of the pilot program that have emerged from the data gathering efforts associated with the evaluation are woven throughout these three parts.

The last section (appendixes) includes supplementary materials such as pre- and post-program surveys and focus group interview protocols associated with both the interim and final evaluation reports.

S E C T I O N   2 .   E V A L U A T I O N   M E T H O D S

This section of the final evaluation report provides brief descriptions of the overall evaluation approach, the tasks associated with both interim and summative evaluations and the specific data-gathering methods used across the life of the project.

evaluation approach & tasks

The approach taken for the evaluation of the *Mentoring Program for Beginning Science & Maths Teachers* pilot project may be characterized as collaborative, outcomes-based, and mixed-method.

First, the evaluation approach can be characterized as *collaborative* as the evaluators worked closely with the mentoring program management group, and particularly the Project Officer, to facilitate the tailoring and timeliness, and maximize the usefulness of monitoring and data-gathering activities.

Second, the evaluation can be seen as *outcomes-based* as the conceptual scaffold guiding the evaluation work comprised both the aims and outcomes associated with the pilot program and a set of questions closely derived from those stated outcomes. Thus, three key questions guided the pilot program evaluation:

1. To what degree was the pilot program implemented as planned?
2. To what degree did the project accomplish its goals and objectives (i.e. improvements in the capacity and resiliency of mentors and mentees and improvements in the likely retention of beginner science and maths teachers)?
3. To what degree can the work and achievements of the program be considered scalable and sustainable? That is, in what form and to what degree are the outcomes of the program likely to live on beyond the scale and time of externally-provided support for the pilot program?

Third, the evaluation approach may also be considered *mixed-method* because it employed both qualitative (e.g., observation, focus group interview) and quantitative (e.g., survey) data gathering techniques to monitor and better understand the operation of the pilot program, as well as to measure its accomplishments. Quantitative methods provide numerical representations of outcomes that can be used to assess accomplishment against goals, standards or targets; qualitative data, on the other hand, provide rich, narrative information that can be used to examine phenomena not readily amenable to quantitative exploration and/or to provide a contextualized, more complete explanation of the phenomenon or program under study.

A listing of the specific data-gathering activities associated with this pilot program evaluation is given in Table 1: Data Sources and Methods. These data-gathering activities resulted from the evaluators meeting with the project's management group to develop agreement on the purposes and major tasks of the interim and final evaluation reports and to sketch the particular methods to be used throughout the evaluation process. Specifically, it was agreed that the evaluation would proceed according to the purposes and pilot program stages described above, while addressing the three core evaluation questions. The answers to these questions would provide the basis for judgments around the success of the *Pilot Mentoring Program for Beginning Science & Maths Teachers* project.

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Table 1: Data Sources and Methods.

Data Source	Data-gathering Method			
	Observation	Pre-program (formative) survey/ questionnaire	Post-program (summative) survey/ questionnaire	Focus group interview
Mentees	Professional development at UWA May 26-27, 2008	n=36 (mainly closed, Likert-type items) See Appendix 1	n=26 (mix of open-ended and closed items) See Appendix 3	Jul 3: n=6 Oct 30: n=3 (catholic and independent schools) See Appendixes 5 & 7
Mentors	Professional development at UWA June 5-6, 2008	n=35 (mix of open-ended and closed items) See Appendix 2	n=20 (mainly open-ended items) See Appendix 4	Jul 2: n=4 (catholic and independent schools) See Appendix 6

observation

Observation refers to the in-person viewing of program activities, either professional development sessions or program meetings. The purpose of all observations is to systematically gain a better first-hand sense of the context, content and focus of the professional development and support provided to mentors and mentees by the pilot program, as well as project management and operations more generally.

focus group interview

The qualitative portion of the evaluation's data gathering also included focus group (face-to-face) interviews with both mentors and mentees across participating schools and sectors. Focus groups were conducted to provide in-depth, narrative data on the experiences of mentoring participants to better understand what worked or did not work for both mentees and mentors, and importantly, why. The interviews with mentors and mentees were guided by semi-structured protocols developed by the evaluators in consultation with the project leadership team (see Appendixes 5, 6 and 7, Focus Group Interview Protocols).

Generally, this series of interviews afforded the evaluators extended opportunities to explore with participants the various ways in which their mentoring relationships developed, factors that facilitated or hindered their mentoring relationships, as well as concrete examples of ways in which participants believe mentoring benefited their work as science and maths teachers. Specifically, the purpose of these interviews has been to better understand participants' views on the nature of mentoring, the professional development provided, as well as the implementation and success of the mentoring

relationships participants had experienced. The focus group interviews also provided a forum to explore participants' views on facilitators and barriers to the success, scalability and sustainability of the mentoring program undertaken. Further, building on the questions asked in the survey, the focus groups provided a good forum for participants to offer their thinking on identifying additional strategies to further develop useful mentoring programs for beginning teachers.

survey questionnaire

The quantitative portion of the evaluation comprised four survey questionnaires as its principal means of gathering data relevant to participants' views on the pilot mentoring program (see Appendixes 1, 2, 3 and 4). These surveys, conducted for mentors and mentees at both the beginning and towards the end of the pilot program, included Likert-type and open-ended questions. Similar to the focus group protocols, the surveys were developed by the evaluators in consultation with the program management team, and in particular the Project Officer for the Mentoring Program for Beginner Science and Mathematics Teachers.
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The surveys included questions that addressed:

- *Demographics of mentor and mentee participants (e.g., qualifications, years experience, etc.)*

- *Mentees' intentions (future plans) regarding staying in the profession of teaching, and factors important in that decision-making;*

- *Mentees' views of their professional development needs, as well as their views regarding the quality of their own preparation as science and maths teachers;*

- *Mentees' and mentors' expectations regarding the pilot mentoring program;*

- *Mentors' perceptions regarding the quality of the professional development on mentoring provided*;

- *Mentees' and mentors' perceptions regarding the success of the pilot mentoring program;* and,

- *Mentees' and mentors' perceptions regarding barriers and facilitators to mentoring.*

In addition, the surveys were designed to include questions that address participants' views regarding what they would consider appropriate additional professional development given the aims of the pilot mentoring program. Particularly for serving the formative purpose of the program evaluation it was essential to hear from participants what they considered useful in terms of building their capacities as beginning science and maths teachers, and their resiliency as new teachers to remain in the profession within their disciplinary contexts.

SECTION 3. EVALUATION FINDINGS & DISCUSSION

overview

The third section of this report comprises the aggregated results of data gathered and analyses conducted for this summative evaluation of the DoIR/UWA *Pilot Mentoring Program for Beginner Science and Mathematics Teachers*. As described previously, the focus of this report is on the implementation and achievements of the pilot program, as well as its likely scalability and sustainability. As such, this section is strongly informed by the earlier interim evaluation (presented to the project Steering Group September 1st 2009) and is presented in three parts organized around project implementation (i.e., professional development for mentees and mentors and project management), project achievements (i.e., building the capacities of new and experienced science and maths teachers and enhancing the likely retention of new teachers within their disciplines in WA), and around project scalability and sustainability.

evaluation question 1: project implementation

The first question asked by this summative evaluation is "To what degree was the pilot mentoring program implemented as planned and funded?" The summative judgment reached—based on the data gathered over the life of the evaluation project—is that the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* has been implemented over its 7-month lifespan, by its management team, with a *high degree of fidelity* to its program plans, and as funded by DoIR.

In its organizational phase during April and May 2008, the mentoring program management group comprised of staff from UWA's Centre for Learning Technology and Graduate School of Education, moved quickly to designate a Project Officer (Dr Mary Oliver), and to recruit the program's external evaluation team through a competitive tender process. The major responsibilities assigned the Project Officer were then to recruit a cadre of maths and science teacher mentees, and a similar sized cadre of more experienced teachers who would serve the pilot program as mentors. In all, 40 graduate teacher mentees were recruited using a variety of methods for disseminating information of the pilot program including Catalist, the email list for the Science Teachers Association of WA (STAWA).

Table 2: Demographics of Science and Maths Graduate Teachers (Mentees)

	Graduate Science and Maths Teachers (Mentees, N=40)		
School Sector	Government n = 25 (63%)	Catholic n = 13 (32%)	Independent n = 2 (5%)
WA Region	Metro n = 22 (55%)		Country n = 18 (45%)
Main Teaching Area	Science n = 21 ((53%)		Maths n = 19 (47%)

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As shown in Table 2, about two-thirds of the 40 graduate teachers recruited as mentees worked in Government secondary schools. Another one-third were from Catholic sector schools, and only 2 of the 40 mentees worked in Independent high schools. Regarding their location within the Perth Metro region or the country regions of WA, the mentee teachers were relatively evenly divided. This was also the case in terms of mentee teachers' self-reported main areas of teaching responsibility that were equally divided between those teaching maths and science.

Similarly, 36 experienced maths and science teachers were recruited to serve as mentors (4 of the mentor teachers each provided mentoring for 2 mentee teachers). Of the 35 mentor teachers who responded to the initial (pre-program) survey, the following characteristics were evident for the group:

> ➢ About 60% were male (21 male, 14 female);
> ➢ Twenty-six (75%) held more than 10 years teaching experience in their discipline;
> ➢ Fourteen (40%) were either Head of Department or Head of Learning Area within their schools;
> ➢ Six were year or group-level coordinators within their schools.

As is evident from these group characteristics, the mentor cadre could be characterized as highly experienced in teaching secondary science and maths, and recognized for their accomplishments in WA schools.

In addition to the recruitment of pilot program mentors and mentees, the Project Officer also held responsibility for the organisation and provision of professional development for both groups. This was done and the professional development sessions held at UWA's Centre for Learning Technology on Monday and Tuesday, 26-27 May 2008 for the mentees, and Thursday and Friday, 5-6 June for the mentors. Both evaluators were present as observers for the duration of the professional development for both mentees and mentors.

For the mentees, the two days of professional development included a variety of offerings well-aligned with mentees' self-perceived needs, as depicted in Figure 1, below.
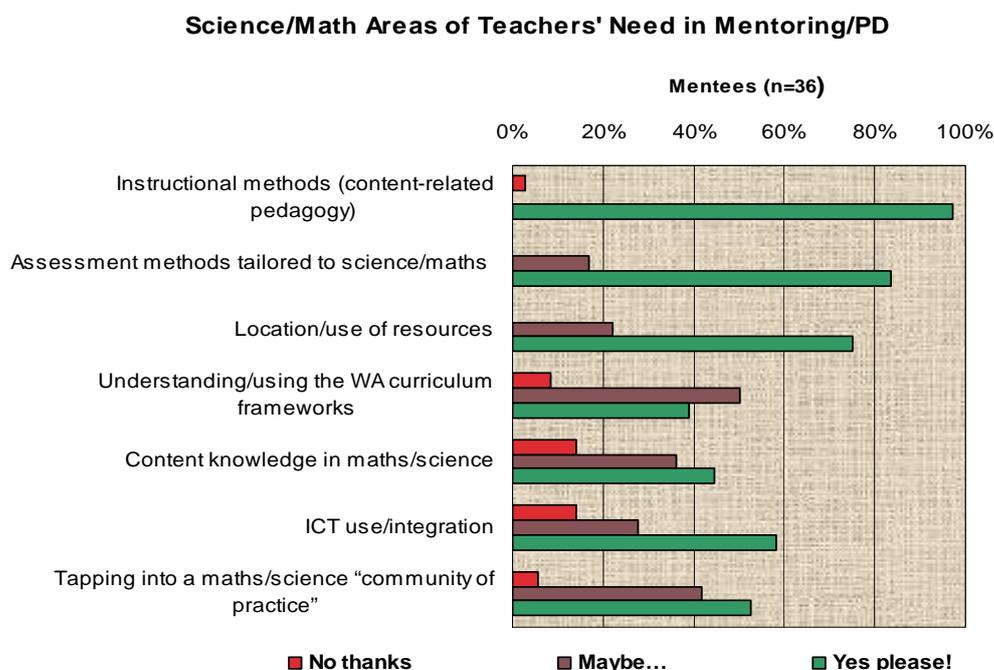

Figure 1. Mentees' Self-Perceived Areas of Need for Professional Development/Mentoring

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Specifically, the two days of professional development for mentees included sessions on:

- classroom management—Helen Egeberg
- student behaviour—Steve Houghton
- assessment for learning—Mark Hackling
- graphics calculators—Steve Ottoway
- role of professional organisations—Chris Fraser
- *Scitech*—Paul Nicholls
- Science Teachers Association of Western Australia (STAWA)—John Clarke
- Mathematics Association of Western Australia (MAWA)—Alan Sadler

Each of these sessions was presented or facilitated by recognized leaders from the WA secondary and higher education communities, and it was a notable achievement on the part of the pilot program and the Project Officer that this could be organized over a relatively short time span. A number of mentees made comment on the professional development received at UWA, and the following are illustrative

> *…the PD at the start was great as well. It was very motivating. I don't know about you guys but I was going back to work going YEH that was excellent!*

> *I think there should be regular PD. Like maybe…at least one every term or something to actually catch up with other people in the group as well. To share stories and stuff like that. You're sort of making contacts in at the same time with people in other schools. Especially when we're all maths and science-based as well, it gives the opportunity for sharing of resources…*

The pilot program's mentors were similarly provided a two-day suite of professional development, the majority of which (one full day) centered on their forthcoming roles as mentors. This training was provided by Ann Rolfe, a highly regarded mentoring consultant. The mentors also received refresher professional development on classroom management (Helen Egeberg) and on classroom observation (Di Gardiner). As portrayed in Figures 2 and 3, the mentors rated very highly the professional development received on mentoring from Anne Rolfe. Additionally, the substance of most of the professional development sessions offered was perceived by those attending as well or very well aligned with their needs as mentors. The following mentors' comments are illustrative:

> *As head of department, I have mentored numerous graduates; the PD drew together and formalised many aspects of what I had done previously. It also provided structures, processes to use.*

> *I very much agree that the PD was well run especially the different mindset of who's observing, asking for advice, what do you want from me as opposed to I want to see you jumping through certain hoops.*

> *I actually went back to the school and said that it was probably the best PD I had ever been to, because it was really effective in changing my idea about what mentoring was.*

> *This is the first time I have seen and been involved in a quality mentoring program in 36 years teaching, due to support!*

> *I think I got a lot out of the mentoring PL that we had, in particular the emphasis on allowing the mentee to make their own decisions and solve their own problems. This has helped me in my role as Head of Senior Science.*

> *The PD provided much needed direction and reaffirmed my beliefs in that we, as experienced teachers, need to nurture and support beginning teachers. It needs to be the mindset of a good educator.*

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Mentors' Workshop Ratings
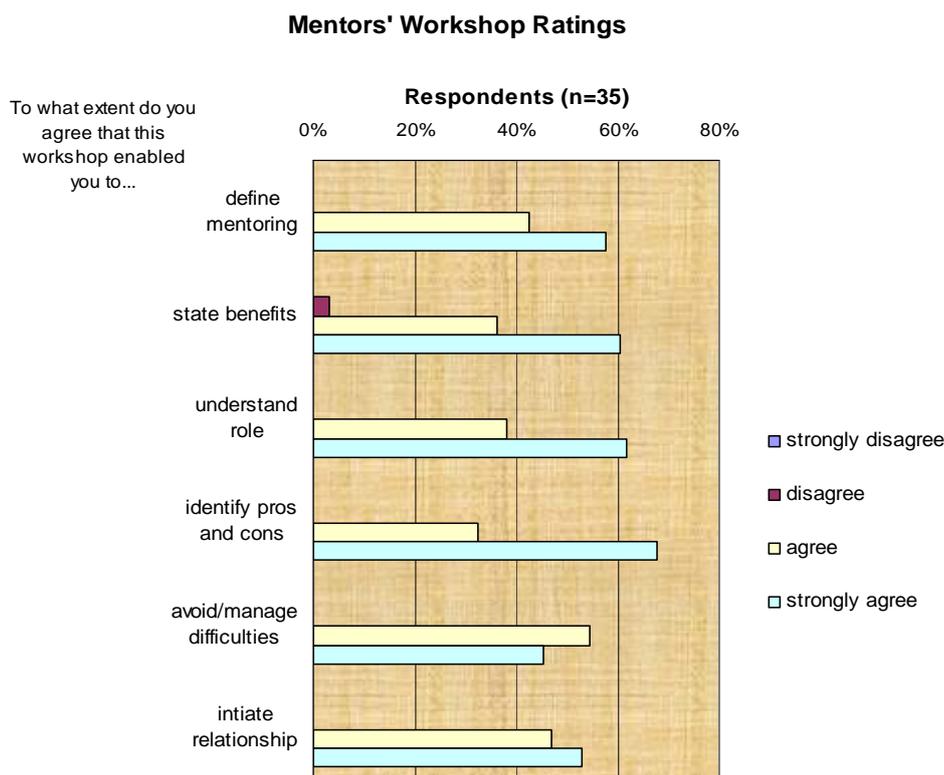
Figure 2.   Mentors' Ratings of Pre-Program Workshop regarding Mentoring Concepts

Mentors' Workshop Ratings
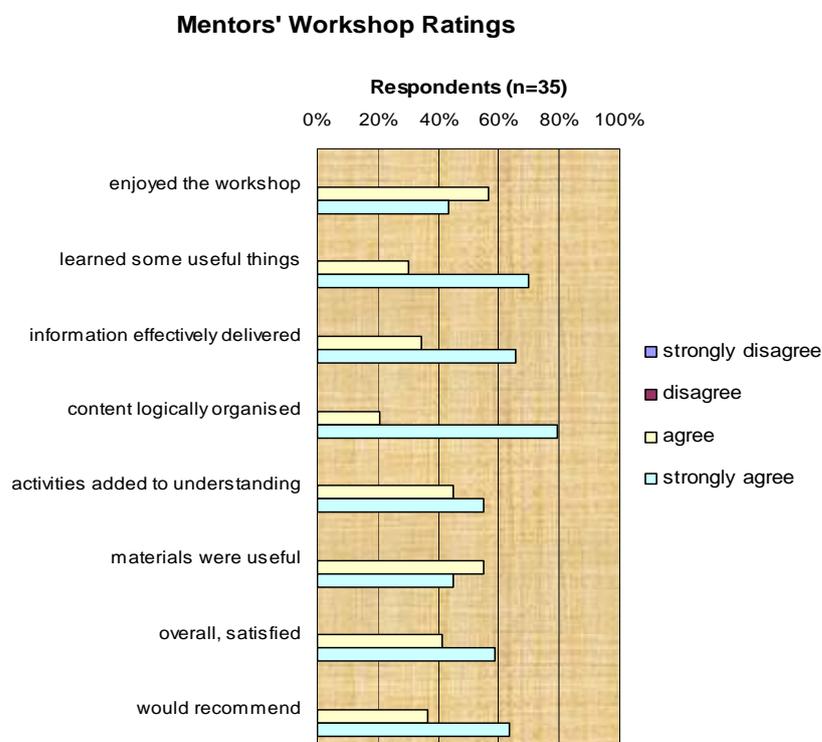
Figure 3.   Mentors' Ratings of Pre-Program Workshop regarding Logistics and Quality

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Beyond the initial recruitment of mentees and mentors, the Project officer also held responsibility for the ongoing monitoring, management and support of mentees and mentors throughout the pilot program. By all reports, this responsibility was acquitted with diligence and care. The following quotes from mentors and mentees support this view:

> *…things were slow to get going in our school and [the Project Officer] was wonderful in the sense that she responded immediately that whilst from my point of view and my mentee's point of view it looked like nothing was happening yet she was telling me about all these wheels that were turning in the background speaking to my principal and deputy principal so, whilst it appeared to have come to a stop, in fact it hadn't and she was still pushing from this end to get the admin side up and running…*

> *… Excellent 2 day PD at UWA…and the constant attention and assistance from [the Project Officer]…*

> *…[the Project Officer's] program was very well run. She was happy to discus any matter that came up and was very prompt with responding to my emails. She kept in constant touch with mentees, while leaving mentors enough "space" to do their mentoring in whichever manner suited them.*

> *[in response to a question asking what to include in possible future programs]… Motivated, dedicated and enthusiastic people to run it like [the Project Officer]…*

However, notwithstanding the clear success of the recruitment, professional development and monitoring and management phases of the pilot program, there is a bit more to the implementation story that is strongly illustrative of the importance that *school context* can, and typically does have on how projects unfold and potentially on their ultimate success. In the current case, there had been commitment and funding on the part of the pilot program that was intended to secure up to 20% workload (teaching) reduction for each of the participating mentees.

Despite this apparent commitment and understanding on the part of participating schools, as well as frequent ongoing negotiating efforts on the part of the Project Officer, in the final analysis 17 out of 40 mentee teachers received no reduction in their workload to participate in the mentoring program. Only nine of the 40 received 0.2 (20%) workload reduction and the remaining 14 varied in the amount of workload reduction afforded by their schools. When examined by school sector, 4 out of 13 Catholic schools provided the full workload reduction. 3 out of 25 Government schools provided the full reduction (13 out of 25 provided zero workload reduction); 2 out of 2 Independent schools provided the 20% workload reduction. The lack of school-provided workload reductions, as intended and funded by the program perhaps did have some impact on the pilot programs' outcomes (particularly with regard to the likely retention of these teachers in the profession). Most certainly, this serves as an additional reminder of how "close to the wind" many schools are forced to sail because of staffing constraints, and particularly so in the case of difficult to staff maths and science positions.

Thus, although the pilot program's management team endeavoured, and indeed enjoyed great success in implementing the overall pilot mentoring program according to the plan that had been developed and funded, it is also important to recognize that this implementation occurred within the context of particular secondary schools with varying degrees of intensity.

evaluation question 2: project accomplishments

The second question asked by this summative evaluation is "To what degree did the pilot mentoring program accomplish its goals and objectives; that is, improvement in the capacity and resiliency of participants and improvement in the likely retention of beginner science and maths teachers?" In regard to this question, the accomplishments of the *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* can be portrayed on at least two levels: first, at the level of capacity- and resiliency-building for new and experienced teachers (the participants); second—and equally

important—in terms of the extent to which the program supported and/or enhanced the likely retention of participant mentees in the teaching profession.

The summative judgment reached—based on the data gathered over the life of the project—is that the pilot mentoring program has achieved its intended goals and objectives with a *good degree of success.*

In answering this evaluation question at the first level, we have framed our findings around the challenges experienced by beginning science and maths teachers as reported by mentees and mentors, as well as the ways in which the pilot mentoring program was able to address these challenges over the seven months of its operation. The challenges for new teachers, reflective of mentors' and mentees' views as expressed in focus group interviews (see Appendix 7) and post-program surveys (see Appendixes 3 and 4) were consistent between the two groups as well as with the literature on mentoring (e.g., Shulman, 2004).

Both the mentors and mentees suggested that major challenges for beginning science and maths teachers include:

- lack of a mentor to offer guidance and assistance;
- lack of support with course planning and school policies, whether written or unwritten;
- lack of sufficient time to be satisfactorily prepared for teaching (regarding curriculum content, instruction and assessment); and
- lack of training/experience in managing inappropriate student behaviour.

The mentees further emphasised difficulties in balancing work and non-work commitments such as personal health, family, and time to relax. Additionally, mentors also held considerable concern around the professional or workplace isolation of the new teachers.

To examine the ways in which the pilot mentoring program addressed these challenges the evaluation data gathering questioned how the participants (both mentees and mentors) had benefited from the pilot program. The mentees suggested that the mentoring setting provided a formal structure in which they were able to ask for help and to reflect on their actions and lessons, which in turn helped their practice improve, as suggested in the following quote:

> *Even though it is common practice by the experienced teachers to provide support to beginning teachers, it was great to have this formalised.* [Within the pilot program] *I was always certain that I was not bothering anyone with all my questions regarding the school and students.*

Further, the pilot program seemed to enable at least some mentees to create a strong peer network of beginning teachers that provided support and/or resources that aided in resolving classroom issues. This also helped with classroom preparation and decisions on how to teach a topic and provided strategies and 'tips' on behaviour management.

For new teachers working in rural schools, one of the more important benefits was the moral and emotional support that they perceived and received through the mentoring program. These teachers felt that they had someone to rely on 'back in Perth' which helped to substantially reduce their feelings of isolation. For example, one rurally-based mentee teacher noted that

> [Without this program] *I really think I would have thrown in the towel by the end of Term 2 since I had better offers to tutor students privately and prepare tax returns….*

This type of sentiment underlines for us the importance of the pilot program in helping this cohort of beginning science and maths teachers navigate and survive the stress of first year teaching. Their mentors provided them not only with resources, but importantly with emotional support on both professional and personal levels. Similarly, the following comment from one of the mentees demonstrates the multidimensionality of the benefits gained by the participants, and well as reminding how easily new teachers can become overwhelmed by the wide variety of tasks required of them.

The program was really "what the doctor ordered." Within the first term of this year I was pretty stressed being the only [science] *teacher here and having to write all the test papers, as well as all the weekly quizzes etc.… and in the meantime, still getting used to the school, behaviour management, lesson preparation for the yr 8, 9 and 10s and managing prac* [sic] *work with 30+ students.*

For their part, mentors generally acknowledged that the program enhanced their feelings of self-worth and brought them a great deal of satisfaction, through recognition of their deep knowledge, skills and experiences teaching science and maths. These notions are reflected in the following quotes:

Experienced teachers need to be rejuvenated by contact with teachers just entering the profession.

It was great to see my mentee's enthusiasm and interest in polishing his teaching and classroom management skills.

Involvement in the pilot program also seemed to enhance reflection among the mentors regarding their own teaching practice and provided the impetus for them to think about "what I do and why?" As one of the mentors commented:

I think I sought to refine my teaching methods while explaining/suggesting methods to my mentee…

Further, some mentors reported that the program helped to improve their problem-solving abilities and also formalized strategies for helping new staff. Additionally, mentors saw opportunities to practise their mentoring skills of being empathetic and non-judgemental as helpful in more consciously using this approach with their own students. Thus, although the pilot mentoring program's core intention was to benefit the beginning teachers, there also were substantial benefits to the mentors through recognizing and sharing in the success of the mentee, by feeling rejuvenated and by improving their own professionalism whether in teaching or with regard to their relationships with other teaching staff in their own schools.

In addressing the question of program accomplishments at the second level, we framed our findings around *indicators of mentoring success* noted by both beginning science and maths teachers as well as by their mentors. When asked about indicators of success, mentees mentioned a number of indicators on both personal and professional dimensions. Frequently, indicators of mentoring success suggested by mentees included

- maintaining a good relationship with one's mentor;
- reduced job-related stress;
- improved self-confidence in teaching maths and science; and,
- observable improvements in the classroom with regard to more effective instructional and assessment strategies, and classroom management.

Thus, on the part of the participating mentees, learning from their mentors strategies that worked with regard to students' learning, behaviour and attitudes increased their confidence and provided strong indications of program success. On the part of mentor teachers indicators for success also comprised the type of relations developed between the mentor-mentee pairs. These were variously characterized as

…open, friendly, relaxed…;
…mentee continues to seek advice; and,
…[we are] *both very keen for regular meetings to continue…*

From a more profession-related perspective, mentors' indicators of success included:

…he is very successful as a classroom teacher; and,
…mentees are more confident and professional than at the beginning of the year.

The mentors also indicated that mentees "opened up" as evidenced by the number and type of questions that were asked. For example, one mentor noted that the mentee had

…more and more questions and informal chat and *observable improvement in his self-confidence…*

The above views notwithstanding, the most pivotal indicator of the extent to which the pilot mentoring program accomplished its goals must relate to the likely retention of new science and maths teachers in the profession. The view that the commitment to stay in teaching is a clear indicator for success was shared by a number of the new teachers, "*I still want to come back and teach next year!*" And, as noted by one mentee:

I think it's successful if most of us are still teachers next year.

Many mentors also felt that the key measure of success was that the mentees continued teaching, and many noted their mentee's desires to continue teaching, and to continue improving as illustrated by the following quote

…mentees are positive and enthusiastic and are keen to return in the New Year and build on what they have learned…

In contrast, from the perspective of the quantitative data gathered through pre- and post-program surveys, and as shown in Figure 4 below, when mentees were asked about their plans for remaining in the profession of teaching beyond 3 years, slightly fewer (77%) indicted that this was "likely" or "very likely" toward the end of the pilot program, than did at the program's beginning (86%). This apparent slight contraction in the proportion of mentee teachers indicating plans to remain in teaching beyond 3 years can be interpreted in a variety of ways.

First, the small proportional difference observed (9%) may simply represent an artifact of the smaller number of mentee teachers who responded to the post-program survey (26 teachers versus 36 who responded to the survey conducted at the start of the program). In other words, this small difference in the proportion of mentee teachers indicating that it was likely or very likely that they would remain teaching science or maths could quite plausibly be different had all mentees responded to the post-program survey. In this regard it is also important to remember that these rates are based on the *self-reported intentions* of mentee teachers looking forward 2 to 3 years.

A second, and perhaps more likely, interpretation is that the self-reported forward-looking attrition rate for this group of mentee teachers did increase slightly by the end of the pilot mentoring program. However, given the mentees' *explanations* of their forward-looking decision making regarding the likelihood of staying in the profession or not, it was clearly evident that for a number of teachers, this decision making was based on a variety of factors, some of which may be outside of the influence or potential influence of a beginning teacher mentorship program. For example, one mentee responding to the post-program survey indicated that

I have never seen teaching as a permanent career move, and have left my options open for the future…

Consistent with what we know about the career mobility and/or career-commitment of current younger generations, it seems that newly graduated teachers may enter a teaching career with plans that they are going to teach for a short period of time that may include teaching overseas, and not necessarily as a lifelong career.

Similarly, in terms of factors that influence teachers' thinking and well-being but may remain outside the influence of a mentoring program, another mentee teacher who explained his/her decision-making on the post-program survey noted that

> *[I'm] sick of dealing with abusive and rude students. In WA I don't feel like I'm an actual teacher, more just babysitting the students and trying to keep them occupied for an hour. Am planning to leave the country to teach somewhere where the teachers are respected (e.g., SE Asia).*

Thus, despite the ability of new teacher mentoring to positively influence the capacity and resiliency of beginning teachers with regard strategies, planning and policies, as evidenced above for this pilot program, perhaps it is also the case that the scale or nature of certain challenges are beyond the ability of mentoring to help. The new teacher quoted above clearly perceived a systemic or school situation inconsistent with her/his vision of teaching in the schools and one that is unlikely to be helped by the individualized, pragmatic strategies offered through one-to-one mentoring.

The quantitative data gathered through pre- and post-program surveys also offered more positive indications of program effect and success. As depicted in Figure 5, mentees were asked what factors are important in their decision making regarding staying in teaching. (In examining this Figure, we have focused on those pre-post differences that appear substantial [i.e., greater than 20%]. This filter was applied due to the small size of the sample overall and also to the fact that a smaller number of mentees responded to the post-program survey.)

Four changes in the factors important in mentees' thinking around remaining in the teaching profession are noteworthy. First, by the end of the pilot mentoring program there was evident a 21% increase in the proportion of mentees who indicated that *mentorship or support provided to new teachers* is important or very important to their decision-making about continuing in teaching. Interestingly, there was also evident a 24% decrease in the proportion of mentees reporting that the *attractiveness of the compensation package (pay and benefits)* is an important or very important consideration for staying in the profession.

Taken together, these shifts in the relative importance that participating mentees ascribed to mentoring/support for new teachers and their compensation indicate that the mentoring program had indeed resulted in a shift in thinking for many of the mentees, and a recognition on their part of the value of tailored, one-to-one mentoring in the professional well-being of new teachers.

Two additional shifts are noteworthy. There were also greater than 20% decreases—from the beginning of the pilot program to its end—in the proportion of mentees who indicated that their *desire to participate in improvement efforts in the schools* and the *challenges provided by the profession* were important or very important factors underlying their decisions on whether to remain in teaching. Absent further empirical explanation from the mentees, one possible explanation for these shifts could be a change in values on the part of many mentees away from an idealistic view of teachers and schools to a more pragmatic one that recognises the need on their part for improving their craft as important to their own continuation and success in the profession.

Overall, having examined the qualitative and quantitative data gathered from mentees and mentors, our on-balance conclusion must be that this pilot mentoring project has accomplished its aims to a good degree. Undoubtedly, the capacity and resiliency of the majority of mentees was enhanced by participation in the program. For some mentees, the clear indication is that the program provided the support that was crucial in keeping them from leaving teaching during their first year. Equally, the pilot program had reciprocal positive effects for many mentors, in terms of allowing them professional recognition, rejuvenating their enthusiasm and techniques, and allowing them a good avenue for passing on their professional experience and wisdom in the service of the profession. On the question of enhancing the retention of this group of beginning science and maths teachers beyond the critical 3-year point, we cannot answer with certainty due to the short period of the project and its evaluation as well as the modest number of mentees who answered the post-program survey. However, as explained above, the indications are good that the experience of the mentoring program has made positive differences in mentees' decision-making around staying in the teaching profession.

Mentees' Plans for Staying in Teaching

Mentees (pre n=36; post n=26)
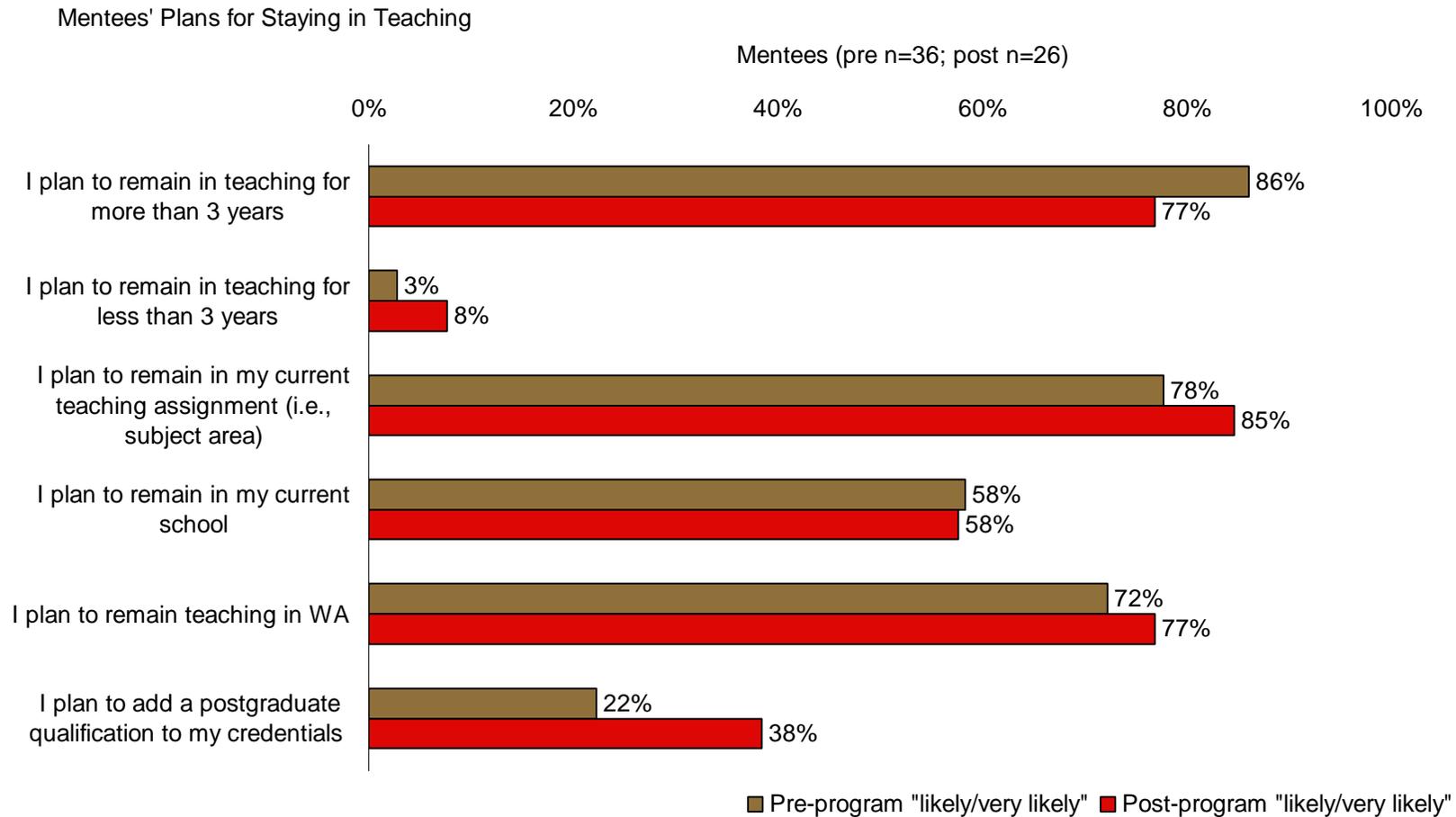
Figure 4. Mentees' Self-reported Plans for Remaining in Teaching, at the Beginning and End of the Pilot Mentoring Program

Mentees (pre n=36; post n=26)
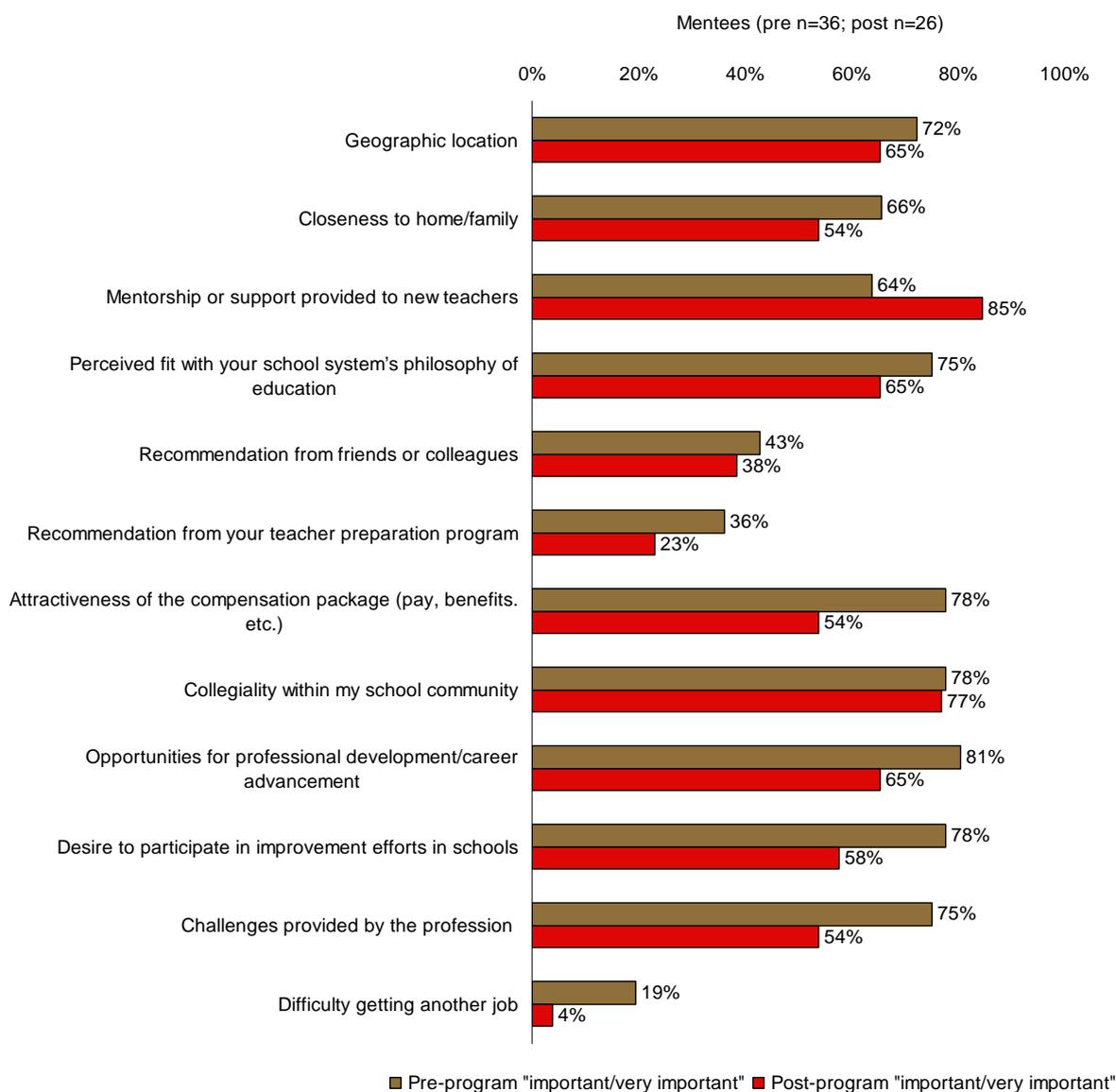
Figure 5.   Relative Importance of Various Factors in Mentees' Decision-making around Remaining in Teaching, at the Beginning and End of the Pilot Mentoring Program

evaluation question 3: program sustainability

The third question asked by this summative evaluation is "To what degree can the work and achievements of the project be considered scalable and sustainable?" That is, what features would be important for a scaled-up mentoring program for beginning science and maths teachers to be able to successfully "stand on its own feet" beyond the time span of external support?

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Consistent with this evaluation's finding for question 2, the summative judgment reached—based on data gathered over the life of the project—is that the outcomes achieved through the work of the pilot mentoring program can be viewed as sustainable to a *good degree*.

In the following section we unpack this finding by examining the scalability and likely sustainability of the program through a review of the facilitators and barriers that enabled or impeded the pilot mentoring program, based on reports from mentees and mentors in surveys and in focus group interviews. In addition we review the recommendations of both mentees and mentors in terms of what to include and what to avoid in the design of future mentoring programs. At the end of the section, based on the analysis of these primarily qualitative data, we provide a set of recommendations for enhancing the likely sustainability of future scaled-up mentoring programs.

First, with regard to factors or pilot program features that *facilitated* the development and effectiveness of mentoring relationships, the graduate teachers (mentees) appreciated the mentoring relationships that had developed with their mentors. These relationships featured mutual respect, commitment, mutual understanding of difficult situations, professionalism, openness and honesty. Some of the mentees also indicated that they had enjoyed the proximity to their mentors that enabled them to talk every day if needed. The following quote illustrates this point:

> *Being able to speak to my mentor every day also meant that I didn't have to wait for email responses or meeting times…I could address any issues as they occurred. This meant they could be dealt with and processed quickly which has taken the stress out of a lot of the issues I have faced this year.*

> *It helped very much that my mentor and I were in the same school. This meant that I did not have to wait a week or until my specified meeting time to get the help I needed. Although we had our formal sessions where we met up and discussed strategies, we also had informal sessions over recess and lunches.*

Other mentees—who were in different schools from their assigned mentors—noted that they needed to schedule meetings to get more practical benefits from their mentoring relationships. Overall, there was a strong consensus that the mentee-mentor relationships enabled the mentees' access to a full range of teaching and assessment resources as well as maintaining focus on behavior management and teaching strategies. Yet, within the structure of these relationships, there was also a great deal of autonomy for mentees to develop their goals with their mentors and they welcomed this flexibility.

However, notwithstanding the importance of the nature of the mentee-mentor relationships, and the physical proximity of mentees to their mentors, there was also general consensus among the mentees that one of the most important features of the mentoring program was the released time (reduced workload) that had been incorporated into the program for many mentees. Having the time and space for regular meetings and having that acknowledged as part of their professional development and workload was seen by a number of the mentees as critical to the effectiveness of the program. The following quotes underline this view:

> *What worked?—having a class less so I could prepare more for the other classes and find more time to discuss issues with my mentor.*

> *…the graduate from uni [sic] needs to have the piece of paper saying "I've got a 0.2"…like when they rock up at the job interview [and] say you can employ me for 0.8 or 0.6 or however but I've got an extra 0.2 like a "get out of jail free card" because the extra time is really just an absolute life saver for beginning teachers…*

> *It was challenging to find a good time to meet at times because although my mentor and I were taken off the relief roster, our free periods clashed most of the times. It would have been great to be given a line off. Unfortunately this could not be done [at my school] due to a lack of teachers.*

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Perhaps even more strongly than the mentees, the mentors also reflected the view that "time was of the essence" for ensuring the effectiveness of this and future new teacher mentoring programs. The following quotes, taken from mentors' reflections on what to include as essential features of future program, support this view:

> *…20% reduction in mentees' teaching load…this has been so advantageous…*

> *Mentees having a 0.8 timetable was a good idea. That allowed time for meetings and discussions between mentors and mentees as well as giving the Beginning Teacher enough time for lesson preparation and, more importantly, time for self-reflection and evaluation.*

Additionally, the mentors saw the pilot mentoring program as having taken a new, more focused and personalised approach and as an extension of teacher professionalism to a new generation of teachers. They perceived their role as one of "*passing the torch*" and a meaningful use of their accumulated wealth of knowledge and experience as science and maths teachers.

As noted previously, the program's mentors also made a singular point of expressing their enthusiasm for the professional development provided at the beginning of the program:

> *…probably the best PD I had ever been to, because it was really effective in changing my idea about what mentoring was…*

> *This is the first time I have seen & been involved in a quality mentoring program in 36 years teaching, due to support!*

> *The PD was excellent in that if I had not experienced it, I would not have reflected as much as I have throughout the year. That is, I have been a far better mentor because of the PD on offer.*

> *The two days training for each group at the start of the program was very necessary so each one's role was clearly laid out. I think the mentees were clear about our role in their first year of teaching. It was important that mentors were not seen as yet another "duty" in the very busy life of a beginning teacher.*

On the other hand, a number of barriers to the development and sustainability of mentoring relationships were also evident. Many, if not most, of these could be characterized as practical or logistical barriers; others revolved more around the complexity of human relationships.

First, as has been previously foreshadowed, some mentees noted that physical distance between mentee and mentor posed a potential challenge; this was particularly the case for mentees located in different schools from their mentors, which was the case for some mentees working in country schools. As one mentor noted, when mentee and mentor are in different schools quite a distance apart, making contact was challenging and it therefore took longer to "break the ice" and establish a productive mentoring relationship.

Additionally, for a small number of mentees, recruitment to the pilot program was another barrier in that some found out about the availability of the pilot program only by accident. Last, on occasion, some schools demonstrated an initial lack of flexibility as the school administration waited to receive funding before adjusting mentees' workloads, or in processing paperwork associated with the program, which in some cases caused delays and frustrations in getting started.

On the human relationship side, a couple of mentors did make note of the challenge associated with being both a mentor to a beginning teacher as well as Head of Department or Head of Learning Area. In some cases, mentors found it a delicate balancing act to both engender the trust and empathy necessary for successful mentoring while at the same time fulfilling their personnel management and/or evaluative roles as Head of Department or Head of Learning Area. In most cases however, the mentors seemed able to effectively separate and fulfill both roles.

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

Thus, in providing an answer to the third evaluation question as to the degree to which the work and outcomes of this pilot mentoring program seemed scalable and sustainable, the data gathered suggest that yes, the program is highly scalable and its outcomes sustainable, *if the following program conditions and features can be provided and sustained absent external support* (i.e., through the commitment and support of the relevant school system authorities):

➢ Appropriate reduction in mentees' teaching workload (e.g., by 20%). This feature seemed widely accepted by both mentees and mentors as a keystone enabler of developing helpful mentoring relationships. Importantly, this allowed mentees sufficient time to implement and reflect on the effectiveness of strategies and resources suggested by their mentors;

➢ Professional development on effective mentoring provided to both mentees and mentors. The literature points to many mentoring programs that trained only the mentors (e.g., Gagen & Bowie, 2005). However, this pilot mentoring program demonstrated that more effective relationships can be achieved if professionally delivered training is provided for both groups. The qualitative data strongly suggest that such training is valuable for the two groups in developing co-partnering relationships that enhance the effectiveness of the program and the likelihood of sustainability for its outcomes.

➢ Co-location of mentees and mentors in the same school, where possible. Based on participants' recommendations, future programs should avoid mentees and mentors located in different schools as this provides a barrier to the timely development of mentoring relationships. When mentors and mentees are co-located relationships not only develop more quickly, but are also more flexible in that mentees' issues can often be addressed without the need for a formal meeting. When no better option is available and the mentor and mentee are in different schools, the use of technology, such as audio or video conferencing, may be one effective way of overcoming the problems created by trying to develop a mentoring relationship at a distance.

➢ Careful selection of mentors, with the possible use of the current cadre of mentors as leaders and/or trainers ("super-mentors") in this process. Both mentees and mentors agreed that the selection of appropriate/experienced mentors should be carefully done, with mentor selection perhaps based on their passion for teaching within science and mathematics. However, given the characteristics of good mentors listed by both mentors and mentees it is apparent that solid interpersonal skills such as empathy and listening are also critical skills for effective mentors. It was also suggested that the current cadre of mentees could serve as 'critical friends' or 'mentor buddies' for new teachers in future programs.

➢ Recognition by key parties that content expertise in science and maths is not the only key to the successful and lasting induction of new teachers in the profession. The data gathered were clear in conveying the message that these new teachers most often needed support and guidance not in the content of their disciplines, but in the choice and appropriate use of instructional and assessment strategies, in coherently programming their work over extended periods of time, in the management of students' classroom behaviour and in successfully understanding and navigating unfamiliar school policies.

➢ Enhance school and teacher planning by beginning the mentoring program at the beginning of the academic year, with information about its availability widely advertised prior to the school year. Timely and broad-based provision of information not only enhances the ability of schools to plan their staffing but is also likely to enhance the uptake of the program by potential mentors and mentees and by the schools.

➢ Build in regular group milestone/checkpoint meetings throughout the school year. Such meetings can serve to enhance collegiality through the sharing of experiences and ideas. In addition, group milestone meetings can serve as a mechanism for enhancing accountability during the life of the program, by providing a "public forum" for discussing successes and challenges among the mentoring pairs. However, many mentors and mentees also lauded the

flexibility within the pilot program and underlined their view that this should be maintained by limiting the involvement of school administrators.

➢ Continue to systematically evaluate the program. There should continue to be a systematic evaluation of the program that would continue to provide mechanisms for timely feedback to the program's managers oriented toward program improvement. Equally, such systematic evaluation would provide periodic assurance for all stakeholders on the mentoring program's overall effectiveness, as well as the sustainability of its outcomes. Ideally, both the improvement and accountability purposes of program evaluation would be better served by a timeframe that was not as limited as that of the current case.

Taken together therefore, our analysis of the varied sources of evidence gathered and aggregated through this program evaluation results in a clear conclusion. The 7-month *Pilot Mentoring Program for Beginner Science and Mathematics Teachers* was implemented with a high degree of fidelity to its funded plans, and has enjoyed a good degree of success with regard capacity-building for both mentees and mentors and enhancement of the likely retention of this cadre of beginning science and maths teachers in the teaching profession. Additionally, the pilot mentoring program appears highly scalable and its outcomes sustainable if appropriate conditions (especially workload reduction for new teachers) can be met by the key system stakeholders involved. Having heard the stories related by this cadre of new and experienced maths and science teachers—clearly the best of the profession that WA has to offer—such investment in the near-term induction of new teachers is likely to pay large dividends for WA's schools and students over the medium and longer terms.

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A P P E N D I X   1 .   P R E - P R O G R A M   S U R V E Y   (M E N T E E S)

University of Western Australia: Centre for Learning Technology
Mentoring Program for Beginning (1ˢᵗ Year) Science and Mathematics Teachers

Initial Survey for Mentees

We assure you that your individual responses to this survey are confidential and will be seen only by the program evaluators, Dr. Dorit Maor and Dr. Andrew McConney of Murdoch University. The aggregated (combined) responses will be provided to the UWA mentoring program staff so that they can tailor the program to best meet your needs.

Mentoring Program ID#:_____

Future Plans

1. Please rate the following statements as they <u>currently</u> apply to you:

	Not likely	Somewhat likely	Uncertain	Likely	Very likely
a. I plan to remain in teaching for more than 3 years	1	2	3	4	5
b. I plan to remain in teaching for less than 3 years	1	2	3	4	5
c. I plan to remain in my current teaching assignment (i.e., subject area)	1	2	3	4	5
d. I plan to remain in my current school	1	2	3	4	5
e. I plan to remain teaching in WA	1	2	3	4	5
f. I plan to add a postgraduate qualification to my credentials (specify: _____)	1	2	3	4	5

2. Please rate each of the following in terms of its importance in your **future choice to continue teaching** in WA.

	Not important		Somewhat important		Very important
a. Geographic location	1	2	3	4	5
b. Closeness to home/family	1	2	3	4	5
c. Mentorship or support provided to new teachers	1	2	3	4	5
d. Perceived fit with your school system's philosophy of education	1	2	3	4	5
f. Recommendation from friends or colleagues	1	2	3	4	5
g. Recommendation from your teacher preparation program	1	2	3	4	5
h. Attractiveness of the compensation package (pay, benefits. etc.)	1	2	3	4	5
i. Collegiality within my school community	1	2	3	4	5

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

		Not important		Somewhat important		Very important
j.	Opportunities for professional development/career advancement	1	2	3	4	5
k.	Desire to participate in improvement efforts in schools	1	2	3	4	5
l.	Challenges provided by the profession	1	2	3	4	5
m.	Difficulty getting another job	1	2	3	4	5
n.	Other (specify)_____	1	2	3	4	5

3. <u>If you are planning a change</u> in career, school or assignment, please briefly indicate the reason(s).

Teachers' Work

4. For each of the following aspects of teachers' work, please indicate
   1) if it is an area in which you would like professional development / mentorship;
   2) the degree to which you feel you were prepared by your teacher education program.

1) Mentoring/ professional development?				2) Quality of preparation?			
Yes	**No**	**Generic Areas of Teachers' Work**		**Poor**	**Fair**	**Good**	**Excellent**
y	n	Develop daily lesson plans for classroom instruction		1	2	3	4
y	n	Develop long-term lesson plans for classroom instruction		1	2	3	4
y	n	Manage student behaviour in the classroom		1	2	3	4
y	n	Organize the classroom in a manner that will foster learning for all students		1	2	3	4
y	n	Teach to a variety of learning styles		1	2	3	4
y	n	Teach students who are learning disabled		1	2	3	4
y	n	Teach students who speak English as a second language		1	2	3	4
y	n	Maintain a safe learning environment in the classroom		1	2	3	4
y	n	Manage time in terms of lesson planning, marking/grading, parent interactions, etc.		1	2	3	4
y	n	Use technology to enhance instruction and assessment		1	2	3	4
y	n	Incorporate critical thinking into instruction and assessment		1	2	3	4
y	n	Develop classroom assessment methods and link them to support student learning		1	2	3	4
y	n	Effectively communicate with students, their families, and other educators		1	2	3	4
y	n	Maintain teacher standards for professional and ethical behavior		1	2	3	4

5. Please indicate in which of the following areas of teaching science or maths mentorship/professional development would be helpful in improving your experience as a beginning teacher (choose all that apply)

	No thanks!	Maybe…	Yes please!
a. Instructional methods (content-related pedagogy) specific to science/maths (e.g. designing engaging hands-on work for students)	1	2	3
b. Assessment methods tailored to science/maths (e.g. designing authentic performance assessment for students)	1	2	3
c. Location/use of resources related to teaching maths/science	1	2	3
d. Understanding/using the WA curriculum frameworks and/or syllabi specific to secondary maths/science	1	2	3
e. Content knowledge in maths/science	1	2	3
f. ICT use/integration in science/maths	1	2	3
g. Tapping into a maths/science "community of practice"	1	2	3
h. Other (describe): _____	1	2	3

Expectations of Mentorship

6. Please list/describe three ways in which you are enjoying being a first-year teacher.

7. Please list/describe three challenges you face as a beginning maths/science teacher. That is, what do you find difficult as a first-year teacher?

8. What are three ways in which you hope to benefit from your participation as a mentee?

9. Please describe one barrier that you needed to overcome and one catalyst that helped you to participate in this mentoring program.

10. Please describe any step(s) that your school has taken to support your participation in this mentoring program.

11. Is there anything that we have not asked that you would like to comment on?

The Evaluation of a Pilot Mentoring Program for Beginner Science and Mathematics Teachers

About You

1. Please indicate your gender: (i) male ☐   (ii) female ☐

2. What type of university degree do you hold? (tick all that apply)
    BEd ☐   BSc ☐   BA ☐   Grad Dip Ed ☐   MEd ☐   MSc ☐   MA ☐   PhD ☐

3. University (undergraduate) major: _____

4. University (undergraduate) minor: _____

5. Master's major, if applicable: _____

6. Please list the subject(s) you are currently teaching:

7. What year(s) (i.e., grade level(s)) are you currently teaching? (tick all that apply)
       Year 8 ☐   Year 9 ☐   Year 10 ☐   Year 11 ☐   Year 12 ☐

8. How many students do you currently teach (in total)? (provide best estimate if not certain)
    _____

9. School where currently employed:
    _____

A P P E N D I X   2 .   P R E - P R O G R A M   S U R V E Y   (M E N T O R S)

University of Western Australia: Centre for Learning Technology
Mentoring Program for Beginning (1st Year) Science and Mathematics Teachers

Initial Survey for Mentors

We assure you that your individual responses to this survey are confidential and will be seen only by the program evaluators, Dr. Dorit Maor and Dr. Andrew McConney of Murdoch University. The aggregated (combined) responses will be provided to the UWA mentoring program staff so that they can tailor the program to best meet your needs.

Mentoring Program ID#_____

1. What are your reasons for joining the mentoring program?

2. What are the specific skills that you bring to the metoring process?

3. What are the areas of knowledge and experience that you will contribute in the mentoring relationship?

4. What are the ways in which you hope to benefit from your participation as a mentor?

5. Indicate the areas in which you would be willing to mentor a beginning teacher.

6. Please describe what you think are the three major barriers that new teachers need to overcome.

7. Is there anything that we have not asked about that you would like to comment on?

About You

10. Please indicate your gender: (i) male ☐   (ii) female ☐

11. What type of university degree do you hold? (tick all that apply)
    BEd ☐   BSc ☐   BA ☐   Grad Dip Ed ☐   MEd ☐   MS ☐   MA ☐   PhD ☐

12. University (undergraduate) major: _____

13. University (undergraduate) minor: _____

14. Master's major, if applicable: _____

15. Please list the subject(s) you are currently teaching:

   _____

16. What year(s) (i.e., grade level(s)) are you currently teaching? (tick all that apply)
   Year 8 ☐   Year 9 ☐   Year 10 ☐   Year 11 ☐   Year 12 ☐

17. School where currently employed:
   _____

18. Other administrative roles in the schools:
   _____

19. Years of experience teaching?
   < 5 ☐   6-10 ☐   11-15 ☐   16-20 ☐   > 20 ☐

A P P E N D I X   3 .   P O S T - P R O G R A M   S U R V E Y (M E N T E E S)

University of Western Australia: Centre for Learning Technology
Mentoring Program for Beginning (1st Year) Science and Mathematics Teachers

Post-program Survey for Mentees

We assure you that your individual responses to this survey are confidential and will be seen only by the program evaluators, Dr. Dorit Maor and Dr. Andrew McConney of Murdoch University. The aggregated (combined) responses will be provided to the UWA mentoring program staff so that they can tailor the program to best meet your needs.

About You

1. Please indicate your gender: (i) male □   (ii) female □

2. What type of university degree do you hold? (tick all that apply)
   BEd □   BSc □   BA □   Grad Dip Ed □   MEd □   MS □   MA □   PhD □

3. Please indicate the level of schooling that you are qualified to teach in WA (e.g., primary, secondary)

   _____

4. At what level of schooling are you currently teaching? _____

5. Please list the school subjects that you are qualified to teach in WA (e.g., chemistry)

   _____

6. Please list the subject(s) you are currently teaching:

   _____

7. School where currently employed:_____

Future Plans

8. Please rate the following statements as they <u>currently</u> apply to you:

	Not likely	Somewhat likely	Uncertain	Likely	Very likely
a. I plan to remain in teaching for more than 3 years	1	2	3	4	5
b. I plan to remain in teaching for less than 3 years	1	2	3	4	5
c. I plan to remain in my current teaching assignment (i.e., subject area)	1	2	3	4	5

	Not likely	Somewhat likely	Uncertain	Likely	Very likely
d. I plan to remain in my current school	1	2	3	4	5
e. I plan to remain teaching in WA	1	2	3	4	5
f. I plan to add a postgraduate qualification to my credentials (specify: _____)	1	2	3	4	5

9. Please rate each of the following in terms of its importance in your **future choice to continue teaching** in WA.

	Not important		Somewhat important		Very important
a. Geographic location	1	2	3	4	5
b. Closeness to home/family	1	2	3	4	5
c. Mentorship or support provided to new teachers	1	2	3	4	5
d. Perceived fit with your school system's philosophy of education	1	2	3	4	5
f. Recommendation from friends or colleagues	1	2	3	4	5
g. Recommendation from your teacher preparation program	1	2	3	4	5
h. Attractiveness of the compensation package (pay, benefits. etc.)	1	2	3	4	5
i. Collegiality within my school community	1	2	3	4	5
j. Opportunities for professional development/career advancement	1	2	3	4	5
k. Desire to participate in improvement efforts in schools	1	2	3	4	5
l. Challenges provided by the profession	1	2	3	4	5
m. Difficulty getting another job	1	2	3	4	5
n. Other (specify)_____	1	2	3	4	5

10. If you are planning a change in career, school or assignment, please briefly indicate the

    reason(s)

11. In what ways did **you benefit** from your participation as a mentee? Please address this question at two levels: (i) benefits associated with your participation in the professional development offered; (ii) benefits resulting from your association with your mentor.

Professional development	Relationship with mentor

12. Looking back at your experience in this mentoring program, what in particular has worked for your team? What helped to strengthen the relationship between you and your mentor?

13. What didn't work? What weakened or threatened the relationship? Please describe any challenges you faced as a mentee. Describe briefly how you dealt with these challenges.

14. Given your experience in the mentoring program, what do you think are the major challenges that new teachers face as they start their professional careers?

15. Given your experience of the program, what do you now feel are the essential qualities or characteristics of an *effective mentor*?

16. What qualities or characteristics are important to be an *effective mentee*?

17. In your view, what are the indicators that your mentoring relationship has been successful? What would indicate to you that the mentoring worked?

18. Given your experience as a mentee, if you were to advise on the design of a mentoring program for beginning teachers, what would it look like? What would it include? What would you avoid?

Include	Avoid

19. Is there anything that we have not asked that you would like to comment on?

A P P E N D I X   4 .   P O S T - P R O G R A M   S U R V E Y (M E N T O R S)

University of Western Australia: Centre for Learning Technology
Mentoring Program for Beginning Science and Mathematics Teachers

Post-program Survey for Mentors

We assure you that your individual responses to this survey are confidential and will be seen only by the program evaluators, Dr. Dorit Maor and Dr. Andrew McConney of Murdoch University. The aggregated (combined) responses will be provided to the UWA mentoring program staff so that they can tailor the program to best meet your needs.

1. Please indicate your gender: (i) male ☐   (ii) female ☐

2. What type of university degree do you hold? (tick all that apply)
   BEd ☐   BSc ☐   BA ☐   Grad Dip Ed ☐   MEd ☐   MS ☐   MA ☐   PhD ☐

3. Please list the subject(s) you are currently teaching:
   _____

4. School where currently employed:
   _____

5. Years of experience teaching?
   < 5 ☐   6-10 ☐   11-15 ☐   16-20 ☐   > 20 ☐

6. During this mentoring experience what skills, knowledge and/or personal attributes did you use in your role as a mentor? Please be as specific as possible.

Knowledge	Skills	Personal Attributes

7. In what ways did *you benefit* from your participation as a mentor? Please address this question at two levels: (i) benefits associated with your participation in the professional development offered; (ii) benefits resulting from your association with your mentee.

Professional development	Relationship with mentee

8. Looking back at your experience in this mentoring program, what in particular has worked for your team? What helped to strengthen the relationship between you and your mentee?

9. What didn't work? What weakened or threatened the relationship? Please describe any challenges you faced as a mentor. Describe briefly how you dealt with these challenges.

10. As a mentor, how prepared were you to work with a new science/maths teacher?

11. Given your experience in the mentoring program, what do you think are the major barriers that new teachers face as they start their professional careers?

12. Given your experience of the program, what do you now feel are the essential qualities or characteristics of an *effective mentor*?

13. What qualities or characteristics are important to be an *effective mentee*?

14. In your view, what are the indicators that your mentoring relationship has been a successful one? What would indicate to you that the mentoring worked?

15. Given your experience as a mentor, if you were to advise on the design of a mentoring program for beginning teachers, what would it look like? What would it include? What would you avoid?

Include	Avoid

APPENDIX 5. INITIAL FOCUS GROUP INTERVIEW PROTOCOL (MENTEES)

UWA July 3, 2008

Thanks; purpose/method of focus group; confidentiality.

Perspectives on "mentoring" and first-year (beginning) teaching

1. We are going to start by asking you to briefly introduce yourselves; please give your name, the school at which you teach, and any description of your role or the setting that you would like to share.

2. How were you recruited to participate in this pilot mentoring program? For instance, did your school principal ask for volunteers? Or were you told that this was something you need to do?

3. What convinced you that this is a program in which you want to participate?

4. Please describe any challenges you face as a beginning teacher. That is, what do you find challenging as a first-year teacher? Please talk about how you have dealt with these challenges or difficulties? *(If needed):* As first-year teachers, how prepared do you feel you were to work in a science/maths classroom?

Characteristics of mentors and mentees

1. In the context of professional development for beginning teachers, what does the term "mentoring" bring to mind? That is, please describe what "mentoring" means to you.

2. What are the essential qualities or characteristics of an effective mentor? That is, what type of person or teacher makes an *effective* mentor?

3. Mentoring is a relationship that is a "two-way street." So then, what qualities or characteristics are important to be an effective *mentee*?

4. You have described desirable qualities/characteristics for both mentors and mentees, and we would like to expand a bit on those answers by asking you "bearing in mind the well-known challenges that first-year teachers are likely to face, and your views of mentoring, can a mentor help, and if so, in what ways?

Input for mentoring program design

5. Given the discussion so far, and your experiences as science and maths teachers, if you were to design a program on mentoring for beginning teachers (mentees) <u>and</u> mentors, what would it look like? What would it include? What would you avoid?

6. In what ways does your school's environment facilitate mentoring? How could it be made better? What strategies will you use to work around the barriers?

7. What might be some indicators that the relationship has been a successful one? In other words, how would you define success in this program, or what would indicate to you that the mentoring worked?

Wrap-up

8. Is there anything that we have not asked, or covered in our discussion, that you would like to comment on, ask about or open for discussion? *Additional prompt (if appropriate): What advice would you offer to the mentoring program managers that would best serve beginning teachers, and their students, as they develop and implement this mentoring program?*

That brings our discussion to a close. Thanks so much for taking the time to share!

A P P E N D I X 6 . I N I T I A L F O C U S G R O U P I N T E R V I E W P R O T O C O L (M E N T O R S)

UWA July 2, 2008

Thanks; purpose/method of focus group; confidentiality.

Perspectives on "mentoring" and first-year (beginning) teaching

1. We are going to start by asking you to briefly introduce yourselves; please give your name, the school at which you teach, and any description of your role or the setting that you would like to share.

2. How were you recruited to participate in this pilot mentoring program? For instance, did your school principal ask for volunteers? Or were you told that this was something you need to do?

3. What convinced you that this is a program in which you want to participate?

4. Please describe any challenges you face as a beginning teacher. That is, what do you find challenging as a first-year teacher? Please talk about how you have dealt with these challenges or difficulties? *(If needed):* As first-year teachers, how prepared do you feel you were to work in a science/maths classroom?

Characteristics of mentors and mentees

5. In the context of professional development for beginning teachers, what does the term "mentoring" bring to mind? That is, please describe what "mentoring" means to you.

6. What are the essential qualities or characteristics of an effective mentor? That is, what type of person or teacher makes an *effective* mentor?

7. Mentoring is a relationship that is a "two-way street." So then, what qualities or characteristics are important to be an effective *mentee*?

8. You have described desirable qualities/characteristics for both mentors and mentees, and we would like to expand a bit on those answers by asking you "bearing in mind the well-known challenges that first-year teachers are likely to face, and your views of mentoring, can a mentor help, and if so, in what ways?

Input for mentoring program design

9. Given the discussion so far, and your experiences as science and maths teachers, if you were to design a program on mentoring for beginning teachers (mentees) and mentors, what would it look like? What would it include? What would you avoid?

10. In what ways does your school's environment facilitate mentoring? How could it be made better? What strategies will you use to work around the barriers?

11. What might be some indicators that the relationship has been a successful one? In other words, how would you define success in this program, or what would indicate to you that the mentoring worked?

Wrap-up

12. Is there anything that we have not asked, or covered in our discussion, that you would like to comment on, ask about or open for discussion? *Additional prompt (if appropriate): What advice would you offer to the mentoring program managers that would best serve beginning teachers, and their students, as they develop and implement this mentoring program?*

That brings our discussion to a close. Thanks so much for taking the time to share!

APPENDIX 7. POST-PROGRAM FOCUS GROUP INTERVIEW PROTOCOL (MENTEES)

UWA October 30, 2008

Thanks; purpose/method of focus group; confidentiality.

Perspectives on "mentoring" and first-year (beginning) teaching

1. We are going to start by asking you to briefly introduce yourselves; please give your name, the school at which you teach, and any description of your role or the setting that you would like to share.

2. What in particular has worked for your team? What strengthened the relationship between you and your mentor?

3. In what ways has your school's environment facilitated mentoring? How could it be made better? What strategies did you use to work around the barriers?

4. What didn't work? What weakened or threatened the relationship? Please describe any challenges you faced as a mentee. Please talk about how you have dealt with these challenges or difficulties?

5. These are our findings. Would you like to add anything based on the experience of the last few months? Are these findings still valid?

Characteristics of mentors and mentees

6. Given your experience of the current program, what do you now feel are the essential qualities or characteristics of an effective mentor? That is, what type of person or teacher makes an *effective mentor*?

7. Mentoring is a relationship that is a "two-way street." So then, what qualities or characteristics are important to be an *effective mentee*?

Input for mentoring program design

8. Given the discussion so far, and your experiences as science and maths mentees, if you were to design a program on mentoring for beginning teachers, what would it look like? What would it include? What would you avoid?

9. What might be some indicators that the relationship has been a successful one? In other words, how would you define success in this program, or what would indicate to you that the mentoring worked?

10. In what ways, or perhaps to what degree, has this experience affected your views/plans regarding the teaching profession, and particularly with regard to staying in teaching?

Wrap-up

11. Is there anything that we have not asked, or covered in our discussion, that you would like to comment on, ask about or open for discussion? *Additional prompt (if appropriate): What advice would you offer to the mentoring program managers that would best serve beginning teachers, and their students, as they scale-up this mentoring program?*

That brings our discussion to a close. Thanks so much for taking the time to share!