Mentoring Preservice Teachers of Primary Science

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The State of Science Education

Over the past twenty years the preparation of primary science teachers has been of great concern (Bybee, 1993; Willis, 1995; Crowther & Cannon, 1998; Goodrum, Hackling & Rennie, 2001). In the United States, *"science for all"* has become a key goal of contemporary reform in science education (Gallagher, 2000, p. 509), as science for all aims at increasing scientific literacy, which has implications for economic gain and for empowering citizens (Jenkins, 1990, p. 48). At the forefront of ensuring a scientific literate public are up-to-date and capable science teachers. In Australia, attaining "science for all" is not happening, and there is a "considerable gap between the ideal or intended curriculum and the actual or implemented [science] curriculum" (Goodrum, Hackling & Rennie, 2001, p. 183). Despite indications that primary science is taught, and is more investigative and student-centred than in previous decades (Goodrum, et al., 2001), effective science teaching practice is still not a regular occurrence in many primary classrooms around the world (e.g., Bybee, 1993; Australian Science, Technology and Engineering Council, 1997; Hill, Hurthworth & Rowe, 1998; Lunn & Solomon, 2000).

Locating a Direction for Science Education Reform

Educators (Willis, 1995; Goodrum, et al., 2001) are continually looking for new approaches and agents of change so that the teaching of science may have a chance at permeating the education system. To achieve the "science for all" goal requires a focus on science needs that must commence at the elementary level (e.g., see Ratcliffe, 1998). It is believed "the decisive component in reforming science education is the classroom teacher" which requires classroom teachers to "move beyond the status quo in science teaching" (Bybee, 1993, p. 144). However, even with reform measures teachers' practices have not changed significantly (Tobin, Tippins & Hook, 1994). Preservice teachers on the other hand *are* very interested in practical primary science opportunities *and* theories of learning (Meadows, 1994, p. 10), and it is the in-school context of preservice teacher education that is pivotal for developing teaching practices, which has been argued for primary science in particular (Anderson & Mitchener, 1995; Mulholland, 1999; Skamp, 2001a,b).

This study takes the view that the education of preservice primary teachers is a place to focus attention in an effort to obtain science education reform. Hence, despite the problematic (and implied pessimistic) assessment as to whether current teachers can change the face of primary science practice, teachers are essential in assisting preservice teachers to become agents of science education reform. This acknowledges the assertion that primary teachers, "whether or not they have a specialized background in science, hold the key to understanding how science is presently working in primary schools" (Lunn & Solomon, 2000, p. 1043). Indeed, delivering and implementing effective programs for creating change must include collaborative partnerships, as collaboration is "not only essential, but very desirable to support the change process, to lessen the fear of risk taking, and to provide a forum for analysis of what works and what does not" (Briscoe & Peters, 1997, p. 63). The quality and degree of collaboration within practicum programs can therefore aid the preservice teachers' development. However, "no direct literature has been found to date recording how much practicum or how little practicum (and hence the implied extent of collaboration) is enough to produce a competent elementary science teacher" (Crowther & Cannon, 1998, p. 3, parenthetical comment added). More importantly, very little literature is available as to the specific mentoring that may be required for developing preservice primary science teachers during a practicum.

Generic and Specific Mentoring

Mentoring is typically noted as a relationship between an experienced and a less experienced person in which guidance, advice, support, and feedback are provided (Haney, 1997). The two key players at the centre of the mentoring process are the mentor and the mentee (Page, 1994). These vital positions are also at the centre of achieving the "science for all" goal, as together they are responsible for implementing science education. The mentor's responsibility is leading the mentee "to some sort of competency in teaching" (Berliner, 1986, p. 7), which includes the teaching of primary science. The general result of mentoring is "improvement in what happens in the classroom and school, and better articulation and justification of the quality of educational practices" (Van Thielen, 1992, p. 16). In this way, mentoring can be a means of guiding improvement and change in science education by constructing knowledge about the curriculum, teaching, and learning.

Despite such promise, mentors are not confident in mentoring primary science education (Jarvis, McKeon, Coates & Vause, 2001).

Many studies (e.g., Killion, 1990; Ganser, 1991; Manthei, 1992; Ackley & Gall, 1992) have researched aspects of generic (non subject-specific) mentoring of preservice and novice teachers, and suggesting the practices and attributes of effective mentors as perceived by the key players. Prior to 1990, there had been very few in-depth studies of *generic* mentoring (see Little's review [1990, p. 297]). Although the last decade has produced more literature on generic mentoring (e.g., Tomlinson, 1995; Edwards & Collison, 1996), mentoring in a specific primary subject is virtually non-existent (Peterson & Williams [1998] in mathematics; Hodge [1997] in physical education; Jarvis, et al., [2001] in science).

It has been argued that unique mentoring processes are required for effective teaching in specific subject areas (Peterson & Williams, 1998), and so the prospect of mentoring in primary science education has considerable promise. The idea that a planned, well-structured mentoring program in teaching primary science may have a positive effect on science education reform is not only well worth exploring, but must be a consideration as a new approach for developing primary science teaching. Hence, identification of mentoring attributes and practices in primary science teaching are required. There are two known reports (Coates, Vause, Jarvis & McKeon, 1998; Jarvis, et al., 2001) that have presented specific mentoring for primary science teaching; however these studies are in their formative stages and require clear identification and classification of attributes and practices that are associated with mentoring in primary science teaching.

Research Design

Purpose of this Study

The literature on generic mentoring (e.g., Little, 1990; Feiman-Nemser & Parker, 1992; Tomlinson, 1995; Edwards & Collison, 1996; Long, 1997), mentoring in secondary science (e.g., Allsop & Benson, 1996), and the limited literature in mentoring primary science teaching (Crowther & Cannon, 1998; Coates, et al., 1998; Jarvis, et al., 2001) suggests various mentoring attributes and practices for developing a mentee's teaching in this area. These attributes and practices are reflected in the items on the survey (see Appendix 1). The justification for each item has been previously described (Hudson & Skamp, 2001), but also summarised in the "Results and Analysis" section of this paper. The purpose of this pilot study is to explore, identify, and describe preservice teachers' perceptions of the extent to which they receive the range of mentoring practices that the literature argues would assist them in developing their primary science teaching.

Data Collection and Analysis

In this pilot study, a survey (see Appendix 1) was distributed at an Australian university to all Bachelor of Education preservice teachers (n=59, response rate 100%) at the end of their final (fourth year) practicum teaching experiences. The abovementioned survey included 35 items derived from a review of the literature. Responses to these items were on a five-part Likert scale (i.e., strongly agree=1, agree=2, uncertain=3, disagree=4, strongly disagree=5). Descriptive statistics were derived using SPSS10.

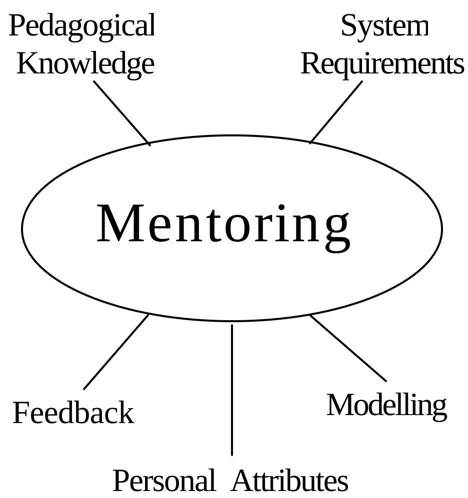
The data were also subjected to an exploratory factor analysis (EFA) to assess the unidimensionality for each of the five factors suggested from the literature. EFA was used to define possible relationships and then using multivariate technique in SPSS10 to estimate these relationships (see Hair, Anderson, Tatham, & Black, 1995, p. 619). EFA statistics were interpreted as follows: items with squared multiple correlations greater than 0.50 indicated a statistical relationship to the proposed factor; eigenvalues greater than 1.00 were retained, as these indicated the number of possible components (factors) confirmed from an identified set of items; and a Cronbach alpha scale greater than 0.70 was considered acceptable for the internal reliability of the items associated with each proposed factor (see Hair et al., 1995). These preliminary EFA statistics provided an indication of this study’s theoretical proposition that there may be five factors for mentoring in primary science teaching. The “method and data define the nature of the relationships”, which is appropriate in EFA (Hair, et al., 1995, p. 619).

Results and Analysis

The hypothesised factors and related mentoring practices and attributes will be examined under the subheadings: personal attributes, system requirements, pedagogical knowledge, modelling, and feedback (see Figure 1).

Figure 1

Proposed Factors in the Mentoring of Preservice Primary Teachers



Personal attributes.

Firstly, there appears to be personal attributes a mentor needs to model for the mentee such as being able to display personal enthusiasm for teaching science (Bybee, 1978), and being able to inspire the preservice teacher to teach primary science (Moran, 1990). Other personal attributes call on the mentor to develop confidence in the mentee to teach science (Lankard, 1996), and to foster a positive attitude for teaching science (Riordan, 1995). Mentees require assistance to solve problems that they experience in teaching science (Ackley & Gall, 1992) such as gathering information for completing university assignments during their practicum (Williams, 1993). A “reflective practicum” (see Schon, 1987) requires mentors to provide (using their personal attributes) opportunities for reflection, and assist in the reflective processes for developing teaching practices, including science teaching (Tobin, Tippins and Hook, 1994). In addition, mentors need to be comfortable in talking about science teaching (Allsop & Benson, 1996), and display ways of addressing teaching anxieties (Yore, 1997; Gonzales & Sosa, 1993).

Table 1 shows 54% of mentors appear comfortable in talking to their mentees about science teaching, and nearly half the mentors assist their mentees with university assignments and provide opportunities for reflection on science teaching. When it comes to addressing science teaching anxieties and providing assistance in reducing science teaching problems, this fraction falls to a little more than a third of the mentors who display these mentoring practices. There were indications that mentors (44%) helped their mentees to feel confident to teach science; however, mentors may not necessarily instil positive attitudes towards the subject (39%), or inspire the mentees to teach science (36%).

Mean item scores (range: 2.51 to 3.25; standard deviations [SD] range: 1.02 to 1.36) indicate that mentees' responses mainly ranged from "uncertain" (coded 3) to "disagreeing" (coded 4) that their mentors displayed "Personal Attributes".

Table 1

Mentees (n=59) who perceived their mentors displayed "Personal Attributes" for mentoring primary science teaching

Personal Attribute	Percentage*	Mean	SD
Felt comfortable in talking	54	2.51	1.02
Assisted with university assignments	49	2.85	1.30
Assisted in reflecting	48	2.69	1.09
Provided opportunities for reflection	46	3.00	1.36
Increased their confidence	44	3.10	1.32
Instilled positive attitudes	39	2.95	1.20
Addressed their anxieties	37	3.03	1.13
Inspired them to teach	36	3.25	1.29

*Percentages refer to the total number of respondents who "strongly agreed" or "agreed" that they experienced the mentoring practice.

System requirements.

Secondly, it has been argued that mentors require science content expertise (Kessleheim, 1998), and knowledge of aims, policies, and procedures within curriculum documents (Lunar & Cullen, 1995; Gonzales & Sosa, 1993). Such knowledge is linked to the education (e.g., state, provincial) syllabus that aims towards quality control in teaching and learning primary science. Indeed, understanding policies and procedures is considered a professional mentoring ability (Riggs & Sandlin, 2002, p. 8).

As can be seen in Table 2, less than half the mentors in this study (44%) were perceived as displaying science content knowledge related to primary science teaching, and only 24% of mentors outlined or discussed the aims, policies, and procedures for teaching science. The results also showed that most mentors (71%) do not outline science curriculum documents to mentees that would aid them towards implementing departmental directives. Mean item scores (range: 3.07 to 3.64; standard deviations range: 1.13 to 1.19) indicate that most mentees generally "disagreed" to "strongly disagreed" that the mentor discussed with them "System Requirements" for science teaching. Even at this "foundational" level of learning about "System Requirements", mentees received minimal mentoring experiences towards planning for teaching primary science. The result is that these mentees, if they have not had previous practicum experiences in planning for teaching primary science (using "system" documents), may lack the practical knowledge of essential planning and, therefore, may not be able to teach science effectively. Although previous practicums and tertiary education may have covered these elements, the final year of preservice teacher education may be the last opportunity to develop (and/or reinforce) "System Requirements" for primary science teaching in the field before entering the profession. If a science syllabus is mandatory then about three quarters of teachers due to enter primary science teaching may have no or little practical understanding of mandatory requirements such as aims, curriculum, and policy, and hence, departmental directives in primary science education may be lost on many of the future teachers.

Table 2

Mentees who perceived their mentors displayed "System Requirements" for mentoring primary science teaching

System Requirement	Percentage	Mean	SD
Showed primary science content	44	3.07	1.17
Outlined curriculum documents	29	3.37	1.17
Discussed the aims	24	3.54	1.13
Discussed policies and procedures	24	3.64	1.19

Pedagogical knowledge.

Thirdly, it is argued that the mentor needs to have "practical knowledge" for implementing effective teaching strategies (Kerka, 1997). For example, strategies for classroom management (Beisenherz & Dantonio, 1996; Rosean & Lindquist, 1992) and questioning techniques (Feiman-Nemser, 1992) are necessary for the mentee's implementation of science teaching. A mentor with knowledge of programming (Rhoton & Bowers, 1996) can also assist the mentee in sequential planning for the teaching of science. Mentors' knowledge of where to obtain science equipment, and knowledge of assessment and evaluation methods of science teaching (Corcoran & Andrew, 1988) provides valuable information for science teaching.

In this study, a small majority of mentors (51%) discussed science programs and assisted the mentee in preparing for science teaching. However, such assistance appears to be limited as only 37% of mentors developed the mentee's problem-solving strategies and

32% of mentors assisted the mentee with obtaining science equipment. One of the most common needs for mentees is learning effective classroom management strategies, which is also perceived by mentors as the most changed practice of mentees during a practicum (Riggs & Sandlin, 2002). Classes that require more management strategies than others can reduce the amount of teaching time, and so classroom management becomes significantly important for preservice teachers; yet only 44% of mentees claimed that the mentor had assisted them to develop classroom management strategies. Mean item scores (range: 2.98 to 3.69; standard deviations range: 0.95 to 1.47) indicate that the majority of mentees "disagreed" that the mentor displayed "Pedagogical Knowledge" in their mentoring practices for science teaching. Fundamental teaching strategies such as discussing assessments (30%) and questioning techniques (25%) were given a low priority by mentors (see Table 3). As a consequence, mentees may not raise the students' level of thinking with higher order questions, and assessment and evaluation procedures may not be implemented for devising further teaching and learning activities for primary science.

Table 3

Mentees who perceived their mentors displayed "Pedagogical Knowledge" for mentoring primary science teaching

Pedagogical Knowledge	Percentage	Mean	SD
Guided preparation	51	3.29	1.30
Discussed mentee's program	51	2.98	1.47
Assisted with classroom management	44	3.42	1.21
Assisted with timetabling	41	3.12	1.40
Assisted with teaching strategies	37	3.47	1.29
Assisted in solving/reducing problems	37	3.07	1.22
Gave clear expectations	36	3.54	1.26
Developed mentee's problem solving	32	3.69	0.95
Obtained equipment	32	3.25	1.24
Discussed assessment	30	3.41	1.26
Discussed questioning techniques	25	3.41	1.18

Modelling.

Fourthly, the literature (Feiman-Nemser & Parker, 1992; Crowther & Cannon, 1998) shows that mentors need to model effective teaching practices. Such modelling aims to demonstrate for the mentee teaching knowledge (Jean & Evans, 1995), the teaching of science (Feiman-Nemser & Parker, 1992), and the syllabus language for teaching science (Abu Bakar & Tarmizi, 1995). The mentor also needs to display enthusiasm for science teaching (Bybee, 1978; Van Ast, 2002), and model ways of coping with teaching demands (Corcoran & Andrew, 1988).

Modelling teaching provides mentees with examples of how to teach, yet in this study, three quarters of mentees said that they did not see their mentor model the teaching of science, let alone more difficult topics in science (83%). The relatively simple process of showing the mentor's program for science teaching was viewed by only 24% of mentees (see Table 4). Modelling how to program for science may imply expectations for planning to teach science and may also show the mentee how to link "System Requirements" and science teaching practices.

Not expected in this study was that 64% of mentees thought their mentors displayed enthusiasm for science teaching. These results may not be consistent with the limited "Modelling" reported and the fact that the majority of mentors were perceived not to have practised over 28 items on the survey. Also the mentee's knowledge of the science syllabus language can assist in understanding the mentor's articulation of primary science teaching practices, however, only 39% of mentors modelled such language, and discussing science teaching knowledge and skills can lead the mentee towards purposeful planning and teaching; yet 59% of mentors did not do this.

Overall, analysis of these results on face value show that, other than mentors displaying enthusiasm for science teaching, most mentors do not model the teaching of science. Mean item scores (range: 2.98 to 3.69; standard deviations range: 0.95 to 1.47, see Table

4) also indicate that the majority of mentees were “uncertain” to “disagreeing” that their mentors were “Modelling” primary science teaching practices.

Table 4

Mentees who perceived their mentors displayed “Modelling” for mentoring primary science teaching

Modelling	Percentage	Mean	SD
Displayed enthusiasm	64	2.41	1.40
Discussed teaching knowledge	41	3.51	1.09
Coped with demands	40	2.86	1.04
Used syllabus language	39	3.00	1.23
Modelled science teaching	25	3.66	1.27
Shared examples of programming	24	2.98	1.47
Modelled the teaching of difficult topics	17	3.85	1.14

Feedback.

Finally, it is argued that effective mentoring occurs when mentors provide feedback to the mentees, which commences with observing the mentees’ science teaching, and then, through oral and/or written communication, providing constructive advice (Christensen, 1991; Monk & Dillon, 1995). Undoubtedly, a powerful form of feedback would be for the mentor to model what was discussed in the mentee’s feedback, so that the mentee can observe first hand successful primary science teaching practices.

In this study, a high percentage of mentors (90%) observed their mentee's science lessons, which enables mentors to gather teaching practice information towards purposeful discussions with the mentee. Furthermore, 81% of mentors provided oral feedback on the mentee's performance as a teacher of primary science. Even though written feedback may be less frequent than oral feedback, which can be expected as it generally takes less time to provide oral feedback than it would to provide written feedback, the majority of mentors (61%) provided written feedback on their mentees' science teaching. Conversely, there were 39% of mentees who received no written feedback, 19% who received no oral feedback, and 10% who were not observed teaching science during their four week professional experience (i.e., practicum). This may mean that as many as 19% of mentees received no feedback on their science teaching at all, and that as many as 10% may not have had *any* experience in teaching science before they enter the profession the following year. Mean item scores (range: 1.78 to 2.53; standard deviations range: 0.87 to 1.28) indicate that the majority of respondents were "agreeing" to "strongly agreeing" that the mentor provided "Feedback" as part of their mentoring practices for science teaching.

Table 5

Mentees who perceived their mentors displayed "Feedback" for mentoring primary science teaching

Feedback	Percentage	Mean	SD
Observed their science lessons	90	1.78	0.87
Provided oral feedback	81	2.00	0.89
Provided written feedback	61	2.53	1.28

Despite providing oral and written feedback, it was shown that the majority of mentors (64%, see Table 3) did not provide clear expectations related to science teaching, which tends to diminish the quality of feedback being provided by the mentors. Nevertheless, the results of providing feedback in this study were positive and may be capitalised upon to develop other needed aspects in the mentoring process.

Exploratory Factor Analysis (EFA)

An initial EFA entering the hypothesised five factors with the associated items as derived from the literature produced squared multiple corrections (SMC), Cronbach alphas, and eigenvalues for each factor (i.e., personal attributes, system requirements, pedagogical knowledge, modelling, and feedback, see Table 6). The purpose of EFA in this study was to assess the unidimensionality for each of the proposed constructs (i.e., five factors).

Eight items (see Table 1) associated with the factor "Personal Attributes" were entered in SPSS10 factor reduction, which extracted only one factor (eigenvalue=5.4) to explain 68% (variance) of this relationship. However, a squared multiple correlation of 0.42 (less than the 0.50 rule of thumb, see Hair et al., 1995) for the item "Assisted with university assignments" indicated that this item may not be significantly related to the factor "Personal Attributes". The four items (see Table 2) associated with "System Requirements" provided only one eigenvalue greater than 1 and 73% of variance. However, the eleven items (see Table 3) linked to "Pedagogical Knowledge" produced a second eigenvalue greater than 1 (with 10% of variance), which indicated more than one factor associated with these eleven items. Using the Varimax rotation method in SPSS10 factor reduction, the item "Obtained equipment" indicated it was responsible for the extraction of a second factor, as it was the only item to produce a square multiple correlation over 0.50 (SMC=0.94). The model was improved by dropping this item and consequently, only one factor was extracted with 69% of variance and a higher Cronbach alpha (0.94), thus improving the model. Assigned items entered into "Modelling" and "Feedback" extracted only one factor each. The seven items (see Table 4) associated with "Modelling" had 65% of variance, while the three items (see Table 5) associated with "Feedback" returned 75% of variance. After one respecification (dropping the item "Obtained equipment"), the five factors, namely, personal attributes, system requirements, pedagogical knowledge, modelling, and feedback had Cronbach alpha coefficients of internal consistency reliability of 0.93, 0.78, 0.94, 0.90, and 0.81, respectively ($p<0.001$, see Table 6).

Table 6

Exploratory factor analysis for the five hypothesised factors

Factor	First component extracted		Second component extracted		Cronbach Alpha
	Eigenvalue	Percentage of Variance	Eigenvalue	Percentage of Variance	
Personal Attributes	5.41	68	0.68	8	0.93
System Requirements	2.93	73	0.66	16	0.78
Pedagogical Knowledge	6.80	69	1.14	10	0.94
Modelling	4.54	65	0.75	11	0.90
Feedback	2.24	75	0.48	16	0.81

(All factors were significant, $p<0.001$)

Discussion

Although this study explores a relatively small sample (n=59), and only tentative conclusions may be drawn, this cohort of mentees represented all of the primary preservice teachers at the end of a four-year Bachelor of Education degree in a New South Wales university. The picture that emerges is mixed with a considerable number of future teachers (maybe as high as 50%) having received a limited mentoring experience in relation to teaching primary science, and with a small percentage (but maybe as high as 30%) obtaining little, if any, assistance in this regard. Despite the positive signs of providing feedback to mentees, there were few mentors who seemed to take a proactive role in exemplifying *specific* science teaching strategies. The question remains, how can science for all be achieved if it is not achieved in the mentoring of future teachers of primary science?

By determining if there are "factors" (i.e., personal attributes, system requirements, pedagogical knowledge, modelling, and feedback) and associated mentoring attributes and practices in primary science teaching, mentoring may become more focused. However, further research is needed to validate the existence of these five factors and their associated attributes and practices.

Conclusion

Primary science education reform has not been successful to date as many primary teachers tend not to change their teaching practices, and yet primary science education reform is necessary if society is to progress towards being a more scientific community. There is "great variability between (Australian) schools in the quality of science education" (Goodrum, et al., 2001, p. 183), and educating preservice teachers is only part of the solution for implementing primary science reform. For reform to occur there must be more experienced and expert overseers, who have clear reform expectations and requirements. This is why primary science reform strategies needs to reach teachers in their roles as mentors, as mentors are the ones to guide mentees' primary science teaching through on-the-spot training. To do so, the mentor must be well prepared and informed on successful and effective mentoring practices.

Formal mentoring programs are considered to be a “planned and intentional process” (Long, 1997, p. 115); however this does not appear to be so for primary science teaching. This study argues that mentors need to be aware of specific attributes and practices in order to develop their mentoring of primary science teaching. Indeed, the breadth of a mentee’s practicum in primary science rests substantially with the mentor. The duration of a practicum necessary to produce effective science teachers may also be linked to the degree and quality of their mentoring. For mentoring to remain a viable and valued component of preservice teacher science education, it is believed that clearly identified subject-specific mentoring practices need to be incorporated into the mentoring process. Subject-specific mentoring may be the reform measure needed to materialise the “science for all” goal.

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Appendix 1

SURVEY: Mentoring Preservice Teachers of Primary Science

For Final Year Bachelor of Education Students

Please circle a number on the scale that reflects your opinion about each statement. The final questions require written comments. To preserve your anonymity, please do not write your name on the questionnaire.

Key

SA = Strongly agree **A** = Agree **U** = Uncertain **D** = Disagree **SD** = Strongly disagree

In teaching science, did your mentor:

	SA	A	U	D	SD
1. show science content expertise? ……..…………………………..	1	2	3	4	5
2. cope with the demands of new curricula? ……………………….	1	2	3	4	5
3. assist you to reflect on your science teaching practices? ……….	1	2	3	4	5
4. increase your confidence to teach science? ……….…………….	1	2	3	4	5
5. inspire you to teach science? ………………………	1	2	3	4	5
6. show enthusiasm for teaching? …………………..……………	1	2	3	4	5
7. outline science curriculum documents? ………………………	1	2	3	4	5
8. discuss the aims of science teaching? ………………………	1	2	3	4	5
9. discuss policies and procedures for science teaching? ………….	1	2	3	4	5
10. discuss your science program? …………..……………………..	1	2	3	4	5
11. show examples of programming science? …………………..…	1	2	3	4	5
12. model science lessons in the classroom? ……………………..…	1	2	3	4	5
13. model the teaching of difficult science topics? …………….....	1	2	3	4	5
14. give clear expectations on teaching science? ……………………	1	2	3	4	5
15. assist you with teaching strategies in science? …………………..	1	2	3	4	5
16. assist you with time-tabling science? ……….……………………	1	2	3	4	5

17. guide you with preparation in science? ………………………..	1	2	3	4	5
18. assist you with classroom management strategies in science? ……	1	2	3	4	5
19. discuss assessing and evaluation of science teaching? ……………	1	2	3	4	5
20. assist you with science resources? ……………………….	1	2	3	4	5
21. have difficulty in obtaining equipment for teaching science? ……	1	2	3	4	5
22. observe you teach science?………………………………………	1	2	3	4	5
23. provide oral feedback of science lessons? ………………	1	2	3	4	5
24. provide written feedback on science teaching? ………………	1	2	3	4	5
25. develop science problem-solving strategies in you? ……………	1	2	3	4	5
26. discuss the knowledge and skills needed in science? ……..….	1	2	3	4	5
27. discuss questioning skills for effective science teaching? ……..	1	2	3	4	5
28. assist with university science assignments? ……………………..	1	2	3	4	5
29. feel comfortable in talking with you about science? …………….	1	2	3	4	5
30. address any of your anxieties about science teaching? ………..	1	2	3	4	5
31. instill positive attitudes towards teaching science? ………………	1	2	3	4	5
32. make you feel more confident as a science teacher?……………..	1	2	3	4	5
33. use science language from the syllabus? ……………..……….	1	2	3	4	5
34. provide assistance to solve or reduce problems in science? ……..	1	2	3	4	5
35. provide opportunities for you to reflect on science teaching? …..	1	2	3	4	5