



IN-SERVICE SCIENCE AND MATHEMATICS TEACHERS' PERCEPTIONS ON CONTINUOUS PROFESSIONAL DEVELOPMENT

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ABSTRACT—This study assessed the perceptions of in-service science and mathematics teachers on continuous professional development (CPD). Exploratory survey design was used. All 152 summer in-service science and mathematics teachers participated consisting of four specialization areas biology, chemistry, mathematics and physics, both sexes, and both primary and secondary schools. The data were collected using a Likert scale questionnaire, and analyzed by using parametric statistics. The results focused on the responses of the teachers on beginning teachers support programs, whether CPD improves teachers' development in teaching, students' development, professional relationships and school level collegiality which were found to be almost an average. There was no significant difference in the perception of teachers in all variables with respect to gender and level of teaching; but chemistry teachers were found to get less teachers development in teaching than biology, physics and mathematics teachers. In terms of the view CPD improved students' development, biology teachers were found to be better than chemistry; and chemistry teachers were significantly lower than biology, physics and mathematics teachers in their perception that CPD improves professional relationships and school level collegiality. Some of the recommendations include the need to strengthen the functional implementation of CPD and conducting further investigation.

KEYWORDS: Continuous professional development; teachers' development in teaching; students' development; professional relationships; and school level collegiality.

1. INTRODUCTION

Day's (1999) definition of Continuous professional development (CPD) encompasses all behaviors which are intended to effect change in the classroom: "Professional development consists of all natural learning experiences and those conscious and planned activities which are intended to be of direct or indirect benefit to the individual, group or school, which contribute, through these, to the quality of education in the classroom".

The main purpose of CPD is to bring quality to the education system. If properly implemented it helps teachers to update their knowledge and increase their general competencies desirable for changing roles and responsibilities. According to Goble and Porter (1977) no reform can be expected to succeed unless it is fully understood and effectively implemented by key actors. This implies that successful implementation of CPD requires from the outset that teachers conceptualize its importance and objective before they start to practice it. The Ministry of Education of Ethiopia-MoE (2009) demands coordination of different stakeholders who have a vital role and responsibility for the application of CPD. In relation to this Advisory Committee on Teacher Education and Qualifications (ACTEQ) (2003) emphasized the role of mentors in supporting personal growth and self-advancement of new teachers. Accordingly, mentors are expected to provide systematic guidance and support to a beginning teacher in day-to-day work, covering different areas. Villegas-Reimers (2003) also voiced that teachers, as professional learners, should get the necessary



professional and administrative support to overcome the challenges of teaching that requires continuous professional maturity.

Teachers' professional development especially their beliefs and practices are important to work in the context of new constructivist and active learning paradigms which reject more traditional behaviorist methods of teaching (National Institute for Educational Development, 2003; UNESCO, 2006). In somewhat similar manner De Monte (2013) indicated that high-quality professional-learning opportunities for teachers should focus on core content and modeling of teaching strategies for the content, opportunities for new teaching strategies and provision of chances for teachers to collaborate. For the effective accomplishment of the goals of education especially of the formal one, it is teacher quality that matters most (Darling-Hammond, 2000). And, for teachers to continue contributing more towards improving the quality of education, they have to undergo CPD. As Ball & Cohen (1999) argue, it is a key mechanism for improving classroom instruction and student achievement. Craft (2000) and Harris (2002) as cited in the research report by Goodall, Day, Lindsay, Muijs and Harris (2005) argue that professional development is centrally important in maintaining and enhancing the quality of teaching and learning in schools. This enables teachers to access new ideas and to share experiences more readily and it gives greater potential for school and classroom improvement. This study was thus conducted to examine the perceptions of teachers towards CPD. Moreover, the study also investigated important aspects of relationships emphasizing on teachers' perceptions and practices of professional development and its contribution for their effectiveness.

1.1 CPD In The Ethiopian Context

The Education and Training Policy (ETP) of Ethiopia sets high standards for teachers and described a new approach to education (MoE, 2010). At the heart of this new approach was the promotion of more active learning, problem solving, and student centered teaching methods. Research surveys such as Derebssa (2006) reported that teachers still relied largely on teacher centered methods with limited opportunities for CPD. The Policy clearly indicated that emphasis should be given to upgrading and updating both pre-service and in-service teachers. It was recognized that teachers were the key to school improvement and therefore a program of in-service CPD was developed in 2005. A CPD Guideline was produced outlining the new strategies and courses developed for the induction of beginning teachers and for CPD priority programs. The beginning teachers were expected to work through a two year induction program, produced at national level and supported by mentors. This program consists of three course books which teachers work through small groups within a school or cluster of schools that include 3 units covering aspects of teaching and learning and school ethos. The groups were designed to be led by facilitators, usually selected from experienced members of the school staff. The expectation was that these groups would meet at least once every two weeks.

At the end of three years of CPD development a TDP 1 Impact Study was carried out by Haramaya University (MoE, 2010). As its major findings it reported that in nearly four out of five schools the structure of CPD is either absent or inadequate; nearly all were not adequately prepared to run well organized, inspiring and transforming CPD activities; in schools where CPD has begun, however, teachers were able to demonstrate a reasonable mastery of the CPD courses, that exhibited a greater change in teachers' practice.

2. STATEMENT OF THE PROBLEM

Guskey (2000) stated that participants' use of new knowledge and skills can be measured using structured classroom observations over a period of time, and Robinson and Sebba (2004) suggested that clear focus on pupil outcomes when embarking upon a program of CPD may result in a greater change in teachers' practice. However, there are potential problems using test scores to measure pupil outcomes. The timescale of CPD can cause difficulties, whereby not only do teachers have to

carry out CPD activities, they then need time to embed any changes in practice, and the changes in practice need time to have any significant impact on pupils attainment. In so doing MoE (2010) revealed six major challenges identified by Haramaya University: failure to synchronize the career structure and the CPD values and activities; CPD facilitators' high turnover; time constraints on teachers as well as their school leaders; CPD program's lagging behind its time and the tendency of rushing to cover the course; total absence or inadequacy of the minimum resources required to run CPD; and lack of systematic collaboration and coordination between Education Bureaus, teacher education institutions (TEIs) and non-government organizations (NGOs). If this is the case, teachers' perception – an important component- from the practices of CPD implementation, is thus worth investigating.

3. RESEARCH QUESTIONS

The research questions for the study were:

- How do teachers perceive the beginning teachers' support programs, perceptions of continuous professional development (CPD), and areas of training needed to improve their teaching?
- Is there a significant difference in the perception of teachers towards beginning teachers' support programs, continuous professional development (CPD) and areas of training needed with respect to gender, specialization and level of teaching?
- Is there a relation between the variables beginning teacher support programs, perceptions on CPD and areas of training needed on CPD?
- Is there significant interaction effect between gender, specialization and level of teaching on the beginning teacher support programs, perceptions on CPD and areas of training needed on CPD?

4. MATERIAL AND METHODS

4.1. Research Design

The present study used exploratory survey design from the quantitative research method.

4.2. Population and Sampling Method

The population for this study consisted of all summer PGDT in-service science and mathematics teachers in Addis Ababa University, and all who were available during the data collection have been included.

Table 1. Background of participants

Participants of the study	Category	Number of students
Sex	Male	41
	Female	111
School	Primary	19
	Secondary	133
Specialization	Biology	33
	Chemistry	34
	Mathematics	47
	Physics	38
Total		152

4.3. Instruments

A 1 - 5 Likert scale ranging from strongly disagree to strongly agree on "In-service Mathematics Teachers' Perceptions on Continuous Professional Development in Schools" which was divided into three major components namely *beginning teachers' support programs*, *perception of teachers on continuous professional development (CPD)* and *areas of training needed* were used for this study. The beginning teachers' support program scale contained 13 items. The perceptions of teachers on continuous professional development (CPD) consisted of measuring how much CPD improves teachers' development in teaching (8 items), CPD improves student development (6 items) and CPD improves professional relationships and school level collegiality (8 items) totaling 22 items. The third component, areas of training needed consisted of 12 items.

The scales were reviewed based on the comments of professionals working at Addis Ababa University for the face and content validity. A pilot study was also conducted to determine the validity and reliability of the scales on thirty summer in-service mathematics teachers from Addis Ababa University who are not included in the main study. From the pilot study the alpha coefficient of Cronbach yielded 0.898 for beginning teachers' support programs scale, 0.956 for teacher development in teaching scale, 0.934 for student development scale, 0.939 for professional relationships and school level collegiality, 0.977 for perception of teachers on continuous professional development scale, and 0.901 for areas of training needed scale. These Coefficients of reliability for the components indicated that they have high internal-consistency reliability.

4.4. Method of Analysis

Since the scale was ordinal of 5 levels Likert scale and the skewness of the distribution for all 46 items and each component lied between -1 and +1, this indicated that the data was not significantly different from normal, allowing the use of parametric statistics for data analysis.

5. RESULT AND DISCUSSION

The first research question was treated separating into components that are given below. As professional supports to beginning teachers are unavoidably crucial in order to make key reforms real and effective in classrooms, Table 1 presents description of the responses on the beginning teachers' support programs. Taking this into account, 13 items were administered to assess the type of support provided for beginning teachers.

Table 2: Descriptive statistics of the responses of the summer in-service science and mathematics teachers on the beginning teacher support programs

No	Item	N	Mean	SD
1	A professional colleague was assigned to be a mentor during my first year	152	3.61	1.293
2	A professional colleague who has received mentor training assigned to be a mentor during my first year	152	3.43	1.326
3	Regular assistance was given on key objectives to be taught	152	3.34	1.224
4	Assistance from colleagues was given in developing student assessments	152	3.44	1.149
5	Support was given in classroom management skills with strategies modeled by experienced colleagues	152	3.59	1.095
6	Regular meetings were held with experienced teachers who teach my grade level or content area	152	3.41	1.252
7	An experienced teacher observed in my classroom	152	3.65	1.246
8	Assistance was given from colleagues in modifying teaching strategies to meet individual student needs	152	3.28	1.158
9	Assistance was given in accessing needed classroom resources	152	3.20	1.100
10	Orientation was given to a new teacher	152	3.27	1.400



11 School policies and procedures in writing were given to a new teacher	152	2.85	1.321
12 Experienced teachers or mentors assist a new teacher with planning	152	3.27	1.332
13 Mentoring continue for more than one year	152	3.06	1.267
Beginning teacher support programs		3.34	

As can be seen from table 2, the response for each item related to the beginning teacher support program was between the least 2.85 and the highest 3.65. These show the need to closely address the support program in order to bring a positive influence on the teachers' practices. In such a situation teachers particularly novice ones could miss what Rhodes & Beneicke; Clutterbuck; cited both in Kennedy, 2005 expressed as counseling and supportive relationship with experienced teachers that contributes for their professional development. As noted by De Monte (2013) coaching, to view a teacher's practice on instructional development and linking teachers to collaborators can help education professionals to improve their practice. Beginning teachers need orientation from the outset and should also be supported in accessing resource. As noted by (ACTEQ, 2003) to be effective, a professional development must impact beyond those who are already enjoying the abundance of learning opportunities. To this end, school management in collaboration with experienced teachers and other key actors should provide professional support and be supportive in availing resources needed to implement CPD. Overall, as evidenced by the individual mean values and the grand mean value (3.34), the presence of regular supports for new teachers to develop their expertise in the classroom, meetings with and classroom observations by mentors and other professional development supports were not entirely verified by all participants. Though the MoE (2003) stressed that support be provided during induction period of new teachers in the first two years of their employment, the practice seems not fully in place as described above. This seems against what was suggested by ACTEQ (2003). According to ACTEQ, to meet the complex demands of today's education system, teachers should have access to a variety of professional learning experiences through a balanced selection of activities. Hence, in a situation discussed above, it could be difficult to get professional support and guidance throughout the induction period for the new teachers. The second component of the first research question was "What is the perception of summer in-service science and mathematics teachers on continuous professional development (CPD)?" the descriptive statistics of which is presented in Table 3.

Table 3: Descriptive statistics of the responses of summer in-service science and mathematics teachers on the perception of continuous professional development scale

Item	N	Mean	SD
I learned new and different ideas from the CPD	152	3.59	1.309
The CPD contributed to personal development	152	3.65	1.230
The CPD developed teaching confidence	152	3.74	1.172
The CPD helped student assessment methods and procedures	152	3.68	1.166
The CPD improved my language proficiency	152	3.35	1.236
Knowledge gained from the CPD will improve my teaching strategies and skills	152	3.70	1.168
The CPD helped on motivation of student learning through different teaching methods	152	3.66	1.179
The CPD increased my knowledge of what can be done in the classroom	152	3.70	1.167
CPD Improves the Teachers Development in Teaching		3.634	
The CPD made me understanding students' diverse needs	152	3.68	1.137
The CPD helped me identifying and supporting students' diverse needs	152	3.70	1.156
The CPD helped whole person development of students	152	3.49	1.128
The CPD improved student learning opportunities in the classroom	152	3.58	1.125
The CPD gave me some useful ideas of how to improve student outcomes	152	3.78	1.140
The CPD improved students achievement	152	3.64	1.226
CPD Improves Students' Learning Development		3.645	
The CPD developed working relationships with individuals and groups	152	3.74	1.154
The CPD enhanced sharing of knowledge and good practices with others	152	3.78	1.129
The CPD developed whole school growth (general development)	152	3.36	1.026
The CPD changed existing teaching habit of the school	152	3.38	1.121



The CPD gave understanding of school goals and policies	152	3.47	1.073
The CPD improved the implementation of school policies, procedures & practices	152	3.51	1.139
The CPD helped formulation of school policies, review of procedures & practices for continuous school development	152	3.39	1.129
The CPD improved in the involvement of parent-related activities	152	3.39	1.134
CPD improves the professional relationships & School level collegiality		3.503	
Perceptions on Continuous Professional Development (CPD)		3.589	

Table 3 revealed that the teachers learned new and different ideas from the CPD, CPD improves the teachers' development in teaching, CPD improves students' learning development, CPD improves the professional relationships & school level collegiality where the overall average was nearly at the range of agree. The perception on CPD was found to have mean value of 3.59. Following this, teachers were asked to rate the areas of training they need.

Table 4: Descriptive statistics of the responses of summer in-service science and mathematics teachers on the items of areas of training needed scales

No	Item	N	Mean	SD
1	Student counseling	152	3.62	1.211
2	Teaching in a multicultural setting	152	3.94	1.050
3	School management and administration	152	4.00	1.055
4	Student discipline and behavior problems	152	3.90	1.161
5	Teaching special learning needs students	152	3.78	1.158
6	ICT teaching skills	152	3.57	1.403
7	Instructional methods	152	3.84	1.068
8	Subject field	152	3.85	1.108
9	Classroom management	152	4.11	1.000
10	Student assessment practices	152	4.05	.982
11	Lesson planning	152	4.09	1.061
12	Action research	152	4.02	1.119
	Areas of training needed		3.898	

From the responses of the teachers, classroom management, lesson planning and students assessment practices were the ones they need most, though they need other components as well. As pointed out by Organization for Economic Co-operation and Development (OECD) (2005), the most effective forms of professional development seem to be those that focus on clearly articulated priorities. Thus, there is a need to focus on those priorities when conducting CPD.

In order to examine significance of differences in school support programs with respect to gender independent sample t-test was used the result of which is given in Table 5.

Table 5: Descriptive statistics and t-test for the responses of summer in-service science and mathematics teachers about school support programs with respect to gender

Components	Gender	N	M	SD	T	df	p
Beginning teacher support programs	Female	41	3.432	.8133	.836	150	.404
	Male	111	3.304	.8463			
CPD improves teachers development in teaching	Female	41	3.656	.9665	.152	150	.879
	Male	111	3.626	1.087			
CPD improves student development	Female	41	3.683	.9753	.285	150	.776
	Male	111	3.631	1.013			
CPD improves professional relationships & School level collegiality	Female	41	3.585	.8485	.658	150	.511
	Male	111	3.473	.9632			
Perceptions on CPD	Female	41	3.638	.8814	.377	150	.706
	Male	111	3.572	.9790			
Areas of training needed on CPD	Female	41	3.929	.6699	.297	150	.767
	Male	111	3.887	.8126			

From Table 5, though the mean of female teachers was found to be higher than those of males, none of them were statistically significant. One-way ANOVA test was also used to see the significance differences among the respondents' school support programs with respect to specialization. Table 6 presents the results.

Table 6: Descriptive statistics and t-test for the responses of summer in-service science and mathematics teachers about the school support programs with respect to specialization

Components	Specialization	N	M	SD	F	p
Beginning teacher support programs	Physics	38	3.530	.7299	1.860	.139
	Chemistry	34	3.072	.8661		
	Biology	33	3.359	.9254		
	Mathematics	47	3.360	.8079		
CPD improves teachers development in teaching	Physics	38	3.852	.9537	6.523	.000
	Chemistry	34	2.967	1.0916		
	Biology	33	3.833	.9569		
	Mathematics	47	3.801	.9955		
CPD improves student development	Physics	38	3.728	.9376	3.055	.030
	Chemistry	34	3.201	1.0523		
	Biology	33	3.828	.9996		
	Mathematics	47	3.770	.9451		
CPD improves professional relationships & school level collegiality	Physics	38	3.622	.9517	4.831	.003
	Chemistry	34	2.989	.9576		
	Biology	33	3.701	.8131		
	Mathematics	47	3.641	.8671		
Perceptions on CPD	Physics	38	3.734	.9135	5.336	.002
	Chemistry	34	3.039	.9886		
	Biology	33	3.784	.8743		
	Mathematics	47	3.734	.8811		
Areas of training needed on CPD	Physics	38	3.829	.7052	5.535	.001
	Chemistry	34	3.559	1.0244		
	Biology	33	4.288	.4574		
	Mathematics	47	3.926	.6879		

From Table 6, except beginning teacher support program, there was statistically significant difference in the perceptions of the respondents in terms of specialization. For those variables that manifested significant differences, Tukey HSD test was used in order to see pair wise comparison of specializations. Table 6 indicates that there were statistically significant differences with respect to specialization on each of the variables.

Table 7: Tukey test of the significant of mean difference of scores of the components of school support programs with respect to specialization

Components	Specialization (I)	Specialization (J)	MD (I-J)	SE	p
CPD improves teachers development in teaching	Physics	Chemistry	.88506*	.23595	.001
		Biology	.01864	.23783	1.000
		Mathematics	.05144	.21805	.995
	Chemistry	Biology	-.86642*	.24425	.003
		Mathematics	-.83362*	.22503	.002
	Biology	Mathematics	.03280	.22700	.999
CPD improves student development	Physics	Chemistry	.52709	.23133	.108
		Biology	-.10021	.23318	.973
		Mathematics	-.04143	.21378	.997
	Chemistry	Biology	-.62730*	.23947	.047
		Mathematics	-.56852	.22063	.053
	Biology	Mathematics	.05878	.22256	.994

CPD improves professional relationships & school level collegiality	Physics	Chemistry	.63274*	.21213	.017
		Biology	-.07905	.21382	.983
		Mathematics	-.01925	.19604	1.000
	Chemistry	Biology	-.71179*	.21959	.008
		Mathematics	-.65199*	.20232	.008
		Mathematics	.05980	.20409	.991
Perceptions on CPD	Physics	Chemistry	.69568*	.21547	.008
		Biology	-.04930	.21719	.996
		Mathematics	.00041	.19913	1.000
	Chemistry	Biology	-.74498*	.22305	.006
		Mathematics	-.69527*	.20550	.005
		Mathematics	.04970	.20730	.995
Areas of training needed on CPD	Physics	Chemistry	.27012	.17518	.415
		Biology	-.45893*	.17657	.050
		Mathematics	-.09658	.16189	.933
	Chemistry	Biology	-.72906*	.18133	.001
		Mathematics	-.36671	.16707	.129
		Mathematics	.36235	.16853	.142

This indicates that chemistry teachers responded significantly and negatively deviated from biology, physics and mathematics teachers in the variable CPD improves teachers development in teaching, CPD improves professional relationships & school level collegiality, and perceptions on CPD; and biology teachers responded significantly and positively deviated from chemistry teachers on CPD improves students development, and also biology teachers responded significantly and positively deviated from physics and chemistry teachers on areas of training needed on CPD. School based comparison was also conducted to compare each of the variables with respect to level of teaching.

Table 8: Descriptive statistics and t-test for the responses of summer in-service science and mathematics teachers about the school support program with respect to level of teaching

Components	Level of Training	N	M	SD	t	df	p
Beginning teacher support programs	Primary	19	3.453	.6249	.641	150	.522
	Secondary	133	3.323	.8635			
CPD improves teachers development in teaching	Primary	19	3.730	.9586	.425	150	.672
	Secondary	133	3.620	1.068			
CPD improves student development	Primary	19	3.807	1.002	.755	150	.451
	Secondary	133	3.622	1.0011			
CPD improves professional relationships and school level collegiality	Primary	19	3.678	.8842	.871	150	.385
	Secondary	133	3.478	.9394			
Perceptions on CPD	Primary	19	3.732	.9191	.698	150	.487
	Secondary	133	3.569	.9574			
Areas of training needed on CPD	Primary	19	3.895	.9141	-.02	150	.984
	Secondary	133	3.899	.7568			

Table 8 indicated that the mean response values of primary teachers exceeded that of secondary teachers in each of the variables except the training needed, though the differences are not statistically significant.

Multivariate ANOVA

The GLM Multivariate procedure provides an analysis for main and interaction effects with the three dependent variables beginning teacher support programs, perceptions on continuous professional development (CPD) and areas of training needed on CPD; while gender, specialization and level of



teaching were taken as explanatory variables. The first check we encounter was to see if correlations are too high or too low.

Table 9: Correlations of the study variables and Box's test of equality of covariance

Variables	Correlations						Box's M	F	df1	df2	p
	1	2	3	4	5	6					
Beginning teacher support programs	1	.42*	.42*	.44*	.45*	.31*	85.13	1.55	48	5633	.009
CPD improves teachers development in teaching		1	.89*	.87*	.97*	.44*					
CPD improves student development			1	.86*	.95*	.45*					
CPD improves professional relationships & school level collegiality				1	.95*	.48*					
Perceptions on CPD					1	.48*					
Areas of training needed on CPD						1					

* $p < 0.05$

From Table 9, we see that each of the variables was significantly correlated. But, for the correlations whose values are above .60, we would consider making a composite variable merging them and considering the variable perceptions on continuous professional development (CPD). The correlations between the three dependent variables beginning teacher support programs, perceptions on continuous professional development and areas of training needed on CPD, however are less than .60.

The second test we encounter was to see the Box's test of equality of covariance matrices. Since the assumption of homogeneity of covariances was violated; Pillai's Trace was the best Multivariate statistic to use. Thus Table 8 indicates multivariate tests for the three dependent variables.

Table 10: Multivariate tests for the three dependent variables

Source	Pillai's Trace	F	df	Error df	P	Partial η^2
Intercept	.901	411.499	3	135	.000	.901
Gender (A)	.023	1.061	3	135	.368	.023
Specialization (B)	.145	2.327	9	411	.015	.048
Level of Teaching (C)	.035	1.638	3	135	.184	.035
A × B	.081	1.269	9	411	.252	.027
A × C	.017	.788	3	135	.503	.017
B × C	.091	1.433	9	411	.171	.030
A × B × C	.047	1.102	6	272	.361	.024

The findings of the full factorial MANOVA (Table 10) yielded a significant main effect for specialization, but no significant main effects for both gender and level of teaching. The results further disclosed that the only main effect of 'Specialization' (Pillai's Trace = .145, $F = 2.327$, $p < 0.05$, $\eta^2 = .048$) was statistically significant. Thus it can be concluded that specialization is significantly related with the dependent variables. In order to determine the magnitude of specialization differences for perceptions on CPD and areas of training needed on CPD and among level of teaching differences for areas of training needed on CPD, pair-wise comparisons were made based on the estimated marginal means.

Table 11: Level of teaching differences in estimated marginal means and means of pair-wise comparisons on areas of training needed on CPD

Dependent Variables	Level of teaching	M (SE)	F	P	Eta ²	Mean Difference
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							(P-S) ^a	SE
Areas of training needed on CPD	Primary	3.412(.213)	4.627	.033	.033	-.520*	.225	
	Secondary	3.932(.073)						

* $p < 0.05$; ^aP-S = the difference between primary and secondary marginal mean scores

The estimated marginal means showed that secondary school teachers scored significantly higher in areas of training needed on CPD than primary school teachers. Hence, the magnitude of level of teaching difference in areas of training needed on CPD is statistically significant ($F(1, 137) = 4.627$, $p < 0.05$, $\eta^2 = .033$). As can be seen from the table, the magnitude of difference of secondary and primary school teachers mean scores was ($M = .520$; $SE = .225$). In other words, compared to primary school teachers, secondary school teachers have gaps in the teaching profession and better training needs.

As in the case of specialization, pair-wise comparisons were also made across the four specialization categories: physics, chemistry, biology and mathematics (Appendix 1). Accordingly, the findings show that the differences among the specialization groups were statistically significant in perception on CPD and area of training needed on CPD. As can be seen from Table 10, the magnitude of differences was the highest in case of areas of training needed on CPD ($M = 1.268$; $SE = .32$; $p < 0.5$) and smallest in case of the perception on CPD ($M = 0.009$; $SE = .293$; $p < 0.5$). As it turned out, it is evident that teachers generally saw high response score in areas of training needed on CPD than perceptions on CPD.

6. CONCLUSIONS AND RECOMMENDATIONS

The overall results of the responses on the beginning teachers support programs were almost average in all the variables. There was no significant difference in the responses of teachers in getting beginning teachers support programs with respect gender, specialization and level of teaching.

It also indicates that a slightly above average response in variables such as CPD helps teachers' development in teaching. In general they suggested that the contribution of CPD improves the teachers' development in teaching. There is no significant difference in the responses of teachers whether CPD improves on teachers development in teaching with respect gender and level of teaching, whereas Chemistry teachers getting less teachers development in teaching than biology, physics and mathematics teachers.

In regard to the students development, the responses indicate that average or a slightly above average response in that CPD helped teachers identify, understand and support student diverse needs, helped them to assist whole person development of students, helped them to improve student classroom learning opportunities, improve student learning outcomes and students' achievement. There is no significant difference in the responses of teachers whether CPD improves on students' development with respect gender and level of teaching; whereas biology teachers responded better students' development than chemistry teachers.

In the items of professional relationships and school level collegiality all indicate above average response in the variables that CPD improved working relationships with individuals and groups, sharing of knowledge and good practices with others, whole school growth, understanding and implementation of school policies, procedures & practices, involvement of parent-related activities. There was no significant difference in the responses of teachers whether CPD improves professional relationships and school level collegiality with respect gender and level of teaching; whereas



chemistry teachers response significantly lower than from biology, physics and mathematics teachers in CPD improves professional relationships & school level collegiality.

The first three priority areas of training identified by teachers were classroom management, lesson planning and students assessment practices; and low priority areas were ICT teaching skills, student counseling and teaching special learning needs students. There is no significant difference in the responses of teachers in areas of training needed on CPD with respect gender and level of teaching; whereas biology teachers needs more training on CPD than physics and chemistry teachers.

Based on the findings and conclusions stated above the following recommendations are forwarded. In order teachers to get positive development, they need beginning teachers support programs that keep them develop at least vertically by level of teaching.

Since Chemistry teachers were found to get less teachers development in teaching than biology, physics and mathematics teachers, this needs further investigation.

CPD was found to help teachers identify, understand and support student diverse needs, and assist them to gear whole person development of students, improve student classroom learning opportunities, improve student learning outcomes and students' achievement, it will be useful to strengthen the functional implementation of CPD.

CPD was reflected to have improved working relationships with individuals and groups, sharing of knowledge and good practices with others, whole school growth, understanding and implementation of school policies, procedures & practices, involvement of parent-related activities. This needs to be extended.

As the first three priority areas of training identified by teachers were classroom management, lesson planning and student assessment practices, CPD need to focus on those areas.

Although the respondents rated ICT teaching skills, student counselling and teaching special learning needs students as low priority, further investigation id needs to uncover these.

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Appendix 1.

Specialization difference in estimated marginal means and means of pair-wise comparisons on perception on CPD and areas of training needed on CPD

Dependent Variables	Specialization	M (SE)	F	P	Eta ²	Mean Difference	
						Between levels	SE
Perceptions on CPD	Physics	3.598(.332)	3.247	.024	.066	P-C = .873	.473
	Chemistry	2.725(.337)				P-B = -.260	.406
	Biology	3.858(.233)				P-M = -.269	.377
	Mathematics	3.867(.178)				C-B = -1.133*	.409
	Total	3.589 (.077)				C-M = -1.142*	.381
Areas of training needed on CPD	Physics	3.528(.260)	5.723	.001	.111	B-M = -.009	.293
	Chemistry	2.970(.264)				P-C = .557	.371
	Biology	4.238(.182)				P-B = -.711*	.318
	Mathematics	3.981(.139)				P-M = -.453	.295
	Total	3.898 (.063)				C-B = -1.268*	.320
						C-M = -1.010*	.298



B-M = .257 .229

* $p < 0.05$; P-C = the difference between physics and chemistry groups marginal mean scores;
P-B = the difference between physics and biology groups marginal mean scores;
P-M = the difference between physics and mathematics groups marginal mean scores;
C-B = the difference between chemistry and biology groups marginal mean scores;
C-M = the difference between chemistry and mathematics groups marginal mean scores;
B-M = the difference between biology and mathematics groups marginal mean scores;