

# IN-SERVICE PROFESSIONAL DEVELOPMENT NEEDS EXPRESSED BY BOTSWANA SECONDARY SCHOOL AGRICULTURE TEACHERS

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## **Abstract**

This study reports on exploratory study designed to identify the In-service Professional Development (IPD) needs of agricultural science teachers in Botswana. Positioned in the context of decentralized reforms of the teachers' IPD by the Education Ministry (Republic of Botswana, 2006, the study aims to voice the teachers' own views of their IPD needs. A questionnaire was used to gather qualitative data from all the secondary agriculture teachers in the Central Region of Botswana (N =247). Categories of teachers' IPD needs identified included those relating to: Teaching Strategies; Subject Matter Aspects; and Personal Needs. Data revealed teachers' views of their IPD needs and demographic patterns that lead to recommendations for more targeted IPD activities. The findings of the study have implications at regional and national levels in Botswana in ensuring targeted IPD provisions for the teachers. Further work is recommended so that agricultural science teachers' IPD needs are better understood nationwide.

**Keywords:** *In-service needs; Agricultural Education; Professional Development; IPD policy; Botswana*

## **Background**

Curriculum reform is often driven by the ambition of raising students' levels of educational attainment with data from international comparative studies e.g. PISA data (OECD, 2009) frequently cited to bolster such goals. As agents of curriculum change, teachers are a fundamental partner in ensuring the success of such reforms. Yet the teachers' voice is not always heard in determining priorities for curriculum reform but nor in how local implementation of such reforms might best be enacted. In the context of the Ministry of Basic Education reforms in Botswana, regarding coordination of locally devolved teachers' in-service training which, in fact, was muted long ago (Republic of Botswana, 2006) and still struggling to effectively take off, a need to establish teachers' own views of their professional development needs was identified. I share the view that professional development activities should meet teachers' '*felt and ascribed needs*' (Knowles, 1984, p. 17). As a result, the nature of the In-service Professional Development (IPD) activities should not be solely determined through reorganizing the coordination structures but also by offering relevant content and methods that are attractive to teachers. In this work, the term IPD is coined to refer to any form of teacher learning undertaken from the first day of service up to retirement as implied by Botswana's Revised National Policy on Education (Republic of Botswana, 1994b).

Professional development (PD) initiatives are usually arranged for teachers on the premise that a skilled and informed teaching force is pre-requisite to higher student achievement. From this perspective, providing teachers with activities that revitalize their areas of specialty and harness technological advancements is a worthwhile objective. This study starts from the position that teachers could be best placed to understand and identify their in-service training needs and that understanding teachers' perspectives could lead to more appropriately targeted IPD with positive impact on practice.

## **Purpose and objectives of the study**

The overarching purpose of this work was to solicit agriculture teachers IPD needs from the teachers' perspectives to inform future selection of their IPD content and thus support the most aspired locally driven IPD provisions (Republic of Botswana, 2016; MoESD, 2015). The specific objectives were:

- to reveal areas of IPD need identified by agricultural science teachers; and
- to detect differences in IPD needs related to selected demographic and other characteristics of the teachers' population

According to Barrick (1987) a needs assessment is required to provide a foundation for in-service training. Various techniques have been employed to conduct needs assessments including: questionnaires (Millar, 1988); interviews (Robinson and Thompson, 1987); and checklists (Fresco and Ben-Chaim, 1986). Borich (1980) also emphasized the value of a model that ranks identified needs to establish priorities for training teachers. However, Witkin (1984) noted that there is no single model or conceptual framework for needs assessment and there is little empirical evidence of the superiority of one approach over another. Accordingly, the educational needs of a group could be better identified by using a variety of needs assessment tools. The view that the perceptions of teachers themselves should be considered in a study that sought to address their concerns, as the agents not the objects of development intentions, is

shared by many authors including Taylor (1997). So, the present study was interested in allowing the teachers to express areas of need in their own words.

### **Research Methodology**

This study is therefore positioned within the interpretivists' framework and adopts a subjective approach to studying teachers' IPD needs (Bryman, 2008; Lincoln and Guba, 1985). The research employed an exploratory survey design involving the population of all the secondary agricultural science teachers in the central region of Botswana (N = 247).

The data discussed in this paper were gathered in 2018 as part of the broader mixed method study which explored In-service Professional Development for agricultural science teachers in the region. This major study adopted the use of structured questionnaire and structured interviews as data sources. The questionnaire comprised, among other aspects, two sections of relevance to this paper. The first section generated demographic data. The other questionnaire section explored how teachers anticipated their future IPD needs and it was in this section where teachers were asked to express areas of need in their own words.

The questionnaire was subjected to expert review and pilot tested with a randomly selected sample (n=30) from a non-target parallel population of agricultural science teachers in the south central region of Botswana.

Data were coded and analyzed using NVivo software. Segments of teachers' questionnaire responses were coded and given 'segment labels' (Coffey and Atkinson, 1967, p. 170) which did not initially exist in the data. Thus a grounded theory-building approach to the data analysis was adopted (Glaser and Strauss, 1967). Literature associated with the teaching of agriculture was helpful in deriving categories of respondents' IPD needs. The needs from the interviews (n= 43) were analyzed separately and used to crosscheck reliability of what teachers wrote in the questionnaires as their needs. There were some similarities in what teachers wrote and said thus proving the trustworthiness of needs identified.

The analysis approach allowed the individual needs to be identified. Groups of similar needs that appeared to be examples of a specific phenomenon were generated. As the analysis progressed, groups and clusters of nodes (categories) emerged that revealed similarities and differences in the IPD needs identified by teachers. The resulting categories are essentially imperative in nature as they represent the researchers' understanding of the relationships between the individual components.

The IPD needs identified across different groups of teachers were identified through a process of pattern coding of the data (Glaser and Strauss, 1967; Bazeley, 2004; and Strauss and Corbin, 1998). This comparative analysis was done across levels of selected demographic characteristics built into the study like gender, school location, teachers' academic qualifications, and education phase, among others. This was achieved through running 'Matrix coding queries' (Bazeley, 2004, p143) which sorted the needs according to the compared groups of teachers. In the process I managed to even identify teachers' groups where particular needs tended to concentrate.

**Results and Discussions**

The teachers were requested to outline IPD needs in their own words without any imposed restrictions, thus findings presented in this article are teachers’ constructs. Of the targeted 247 teachers, 159 of them presented their needs after which they were collated and grouped. The data analysis yielded three main categories of teachers’ IPD needs, each with sub-categories; these were:

- Teaching Strategies
- Subject matter aspects and
- Personal needs.

Only those needs under teaching strategies and subject matter categories are presented and discussed further in this paper. Tables and Bar Charts are used to present the findings.

Table 1 below displays areas of IPD need classed under the broad category of ‘Teaching strategies’ which further divides into sub-categories. The discussion in this section will proceed according to these sub-categories.

**Teaching Methods and Techniques:** The findings in Table 1 show that teachers expressed IPD needs on teaching methods and techniques. Perhaps, unsurprisingly this is evidence that some agriculture teachers feel strongly that such training helps to maintain their identity as teachers. For these teachers, the possession of effective strategies to teach large classes, mixed ability students, and students with special learning needs becomes necessary. At junior secondary level the teachers teach all students regardless of their learning abilities. Also, at senior secondary level, the subject is chosen by many students who are not segregated along learning ability lines.

**Table 1: Identified IPD Needs Related to Teaching Strategies**

Teaching Methods and Techniques	Testing	Use of technology
a. Teaching mixed ability classes	a. Item writing skills	a. Aspects on Information, Communication and Technology relevant to the teaching of agriculture
b. Teaching agric skills to students with special learning needs	b. Assessment of students on practical work	b. Use of computers
c. Differentiated teaching method	c. Exposure to the moderation exercise	c. Exposure to computer programmes e.g. excel, data base etc
d. Handling larger classes	d. Exposure to marking final examination scripts	d. Use of internet
e. Planning educational tours or field trips with students	e. Marking of students’ research projects reports	e. Use of instructional media (Audio /visual aids) e.g. projectors
f. Effective use of conventional methods of teaching e.g. group discussions and demonstrations		
g. Exposed to a variety of improved methods of teaching agriculture		

**Source: Field survey, 2018**

when choosing subjects to undertake. All these could have resulted in teachers facing the challenge of handling students with varied needs hence creating need for teachers to be trained to cope with the situation. The teachers' need to be helped in managing large classes could be an indication that class sizes in agriculture are large and difficult to manage. However, it has come to my understanding that during plan period 9 the government deliberately increased the average class size from 40 to 50 at junior secondary school to achieve the high transition rate from primary to junior secondary school and obviate the drop that would have otherwise resulted from the slow pace of expanding facilities at the time (MFDP, 2009). This was the period when the economic crisis was at its peak and possibly constrained the country's financial base to cope with the economic demands during the period (MFDP, 2009). I take it that increasing class size from 40 to 50 was an interim measure because the 1994 RNPE from which the current ETSSP draws, had long recommended class size of 30 students per class in the public schools (Republic of Botswana, 1994b).

Table 1 also reflects the fact that the teachers showed interest in being exposed to the concept of Differentiated teaching. This could be because teachers see the importance of being tolerant and compassionate when handling students with varying needs as called for by the Botswana's Vision 2036 (Republic of Botswana, 2016). Understanding differentiation in this manner becomes consistent with the concept of inclusive schooling to which Botswana is committed (MoESD, 2015; UNESCO, [2010] 2011; Republic of Botswana, 1994b) This inclusive approach to schooling is in conformity with the international laws which protect people from any kind of discrimination on the basis of their needs (United Nations, [2008] 2010; SEN Policy Option Group, 2007; and Light, 2000).

Table 1 further reveals planning of educational trips and the use of conventional teaching methods as some of the IPD needs identified by the teachers. This could imply that the initial teacher preparatory programmes were not effective enough to equip teachers with these basic methods of teaching, or it could be that there are some technological changes in the field of education that make the conventional methods of teaching obsolete. These very reasons could further explain why teachers also expressed the need to be exposed to improved methods of teaching agriculture.

**Testing:** Table 1 reveals that teachers expressed IPD needs related to testing students on theoretical aspects and practical skills. For practical assessment, it could be that the assigning of students to projects and grading their management capabilities became problematic probably due to large numbers of students. The large classes might be due to the government's policy to increase enrolments in schools in line with its long term Vision 2036 (Republic of Botswana, 2016) as well as the expectations of the international conventions like MDGs, EFA, Jomtien Declaration and Darker Framework of Action (MFDP, 2009), all of which recommends free and accessible education by all. It could also be that teachers need clarification on the use of assessment guides (Ministry of Education, 2000 & 1996). This finding may suggest IPD opportunities that can demonstrate, in situ, how the assigning of students to specific projects and grading of skills could be best achieved. Table 1 further show that teachers expressed a desire to be exposed to the assessment standards for marking moderated projects. All agriculture teachers grade students' practical work and their marking is cross-checked by moderators. It makes sense for teachers to want to share with the moderators similar marking standards for consistency.

Teachers, as reflected in Table 1, expressed a need to be exposed to marking final examination scripts and writing test items. This could be due to the common understanding among the teachers in Botswana that being involved in marking final examinations and also being exposed to the writing of test items would help one prepare his or her students better for the examinations. As a result every teacher wants to be nominated for this marking exercise. Table 1 also indicates that the marking of the project reports is one of the areas in which the teachers need in-service training. It could be inferred from this finding that the teachers could be lacking in research skills rather than just the skills required for grading the research project report. My argument is based on the understanding that for a teacher to grade properly, he/she must have a full understanding of the discipline of the material marked. So in this case they could also be trained broadly in research methodologies.

**Use of Technology:** Professional development needs in the area of Information Communication and Technology were also raised by the teachers as shown in Table 1. The teachers singled out: the use of computers, audio/ visual aids and use of internet as areas they want to be exposed to. There was also no apparent impact of age, experience and phase of education on the teachers' responses under this section. This makes it necessary for all teachers in the region to be exposed to ICT. Having ICT as an area of IPD need could have been encouraged by the government's move of having computer laboratories in all junior and senior secondary schools fully equipped with computers with internet connection (Republic of Botswana, 2016; MoESD, 2015).

**Table 2 below** displays needs relating to a broad category labeled 'Agriculture Subject Matter'. The identified IPD needs in this table cover both the practical and theoretical aspects (Syllabus topics) involved in the teaching of agriculture.

**Practical Aspects:** Teachers have indicated a need for IPD help to sharpen their skills in: managing agriculture projects in schools; grading students' agriculture projects and compile continuous assessment (CA) scores; moderating practical examination; and approaching agriculture as a business. This could be that, with limited teaching time, the teacher training institutions are constrained in what they can provide. The time factor becomes even more limiting where skills are to be taught because according to Cryer and Elton (1993) '*skills cannot be learned without practice ..... with feedback on performance*' (p.17).

**Table 2:** *Identified IPD Needs Related to the Agriculture Subject Matter*

Practical Aspects	Syllabus Topics	
	Junior	Senior
Teachers raised a need to be:	Agricultural Economics	Agricultural Technology
Updated on general skills of effectively managing agriculture projects in a school setting	Artificial Insemination	Biotechnology
	Bee Keeping	
Helped on how to effectively grade students' agriculture projects to compile continuous assessment scores	Government programmes	Game farming
	Know about business	Government programmes
	Ornamentals	
Exposed to the moderation exercise of the practical examination	Ostrich production	Know about business
	Rabbit production	Ornamentals
	Range management	
Exposed to some business skills	Farm management	
	Fish Farming	

**Source:** Field Survey, 2018

The institutions also do not offer tailor-made programme(s) to purely meet the requirements of Botswana secondary school agriculture programme (BUAN, 2018). As a result, gaps are bound to exist that require in-service training provision for teachers.

**Syllabus topics:** Table 2 further shows that teachers identified several syllabus topics as areas of development need. The list is long and it may have implications for the content and quality of the initial teacher training programmes. It could be that the agriculture teacher training programmes partially address the topics thus resulting in the teachers feeling that they were lacking the required knowledge. It could be also that the agriculture syllabuses are up to date that they include some of the current technological advancements on which teachers still need to be updated. Where topics identified as needs are not part of the current agriculture syllabuses, this might reflect a perceived need to incorporate such topics into the curriculum to meet the possible demand for them in the local context.

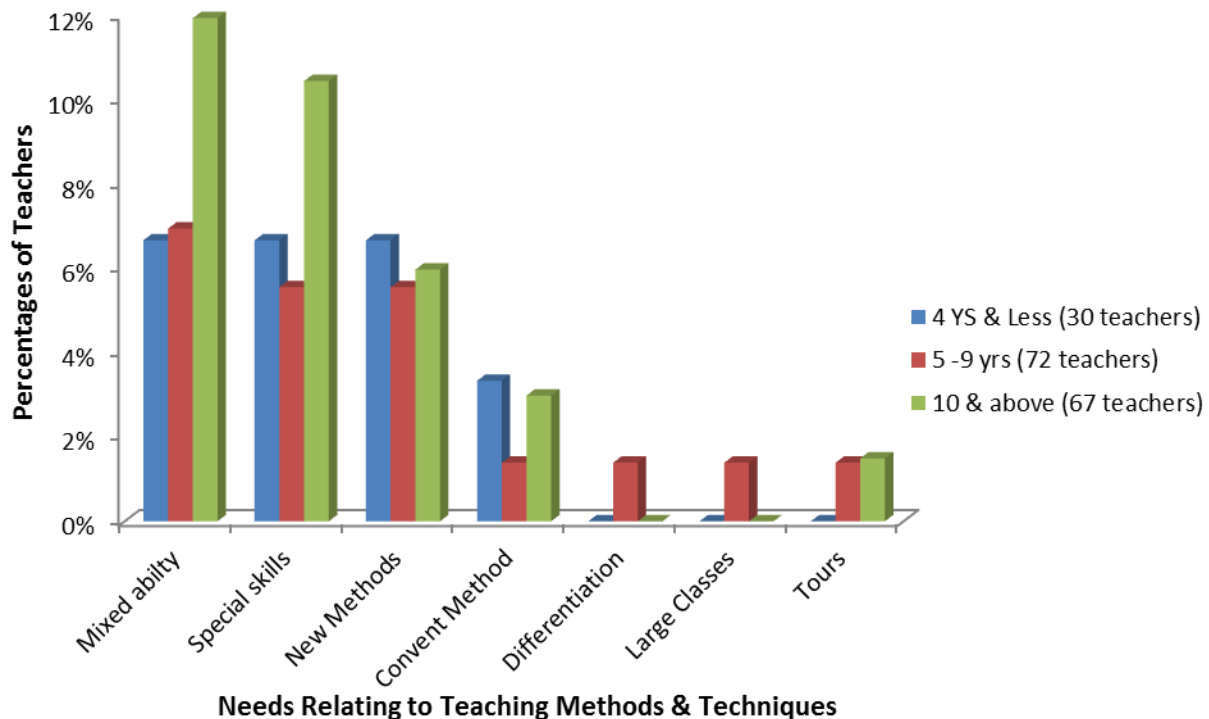
**Salient patterns of IPD needs related to teachers' democratic characteristics and their implications**

As explained earlier, during data analysis, proportions of the different groups of teachers per every IPD need expressed were computed and compared. Teachers were grouped according to the school and their own attributes which include gender, age, qualification, experience, position of responsibility, phase of education, school location, and school performance. Consequently, it became apparent that there were some noteworthy differences in the needs expressed by the different groups of teachers and these are

discussed below together with their implications. Only patterns considered to have practical importance are presented here. The fact that the compared groups had few members, I chose to treat the findings and their implications of these patterns as suggestive rather than conclusive. The bar charts are used to help visualize these differences, as will be seen below. The purpose of using the proportions or percentages here was to ensure comparability.

**Figure 1** below displays the percentages of teachers compared according to experience on IPD needs regarding Teaching Methods and Techniques. The figure reveals that all teachers regardless of years of experience identified mixed ability teaching, special education skills, new methods of teaching agriculture, and conventional methods of teaching as areas of IPD need.

**Figure 1:** Comparison of Teachers’ Percentages According to Experience on IPD Needs Regarding Teaching Methods and Techniques



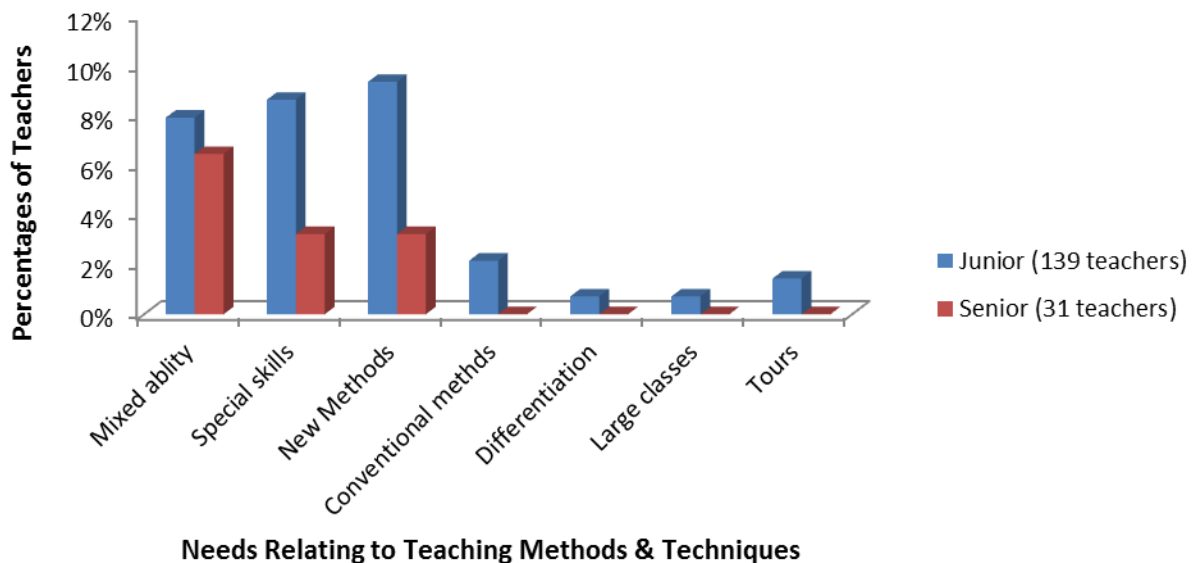
However, Figure 1 shows that the most experienced teachers expressed more IPD need in mixed ability teaching and special education skills than the less experienced groups. This could imply that the teacher training institutions in the past did not incorporate these concepts into their curriculum. It could be that the institutions only started exposing student teachers to them after the recommendation by the 1993 National Commission on Education that they be recognized (Republic of Botswana, 1994b). As a result many of the older and experienced teachers did not learn any of these concepts during their initial teacher training and thus feel this gap in their knowledge more than their counterparts. Again due to increased responsibility in their roles they may want to enrich their knowledge so that they are better placed to advise and support the younger and inexperienced teachers.



Figure 1 also shows that the teachers who expressed IPD need in differentiation, handling large classes and organization of educational tours were very few. This could be an indication that there is less need for in-service training in these areas than it is with the rest of the identified teaching methods and techniques. Some groups of teachers according to experience did not even identify them as areas of IPD need. The reason for this could be that majority of the teachers feel proficient in these areas hence needing little or no in-service training in them.

**Figure 2** below displays the percentages of teachers expressed according to education level/phase compared under each IPD need relating to Teaching Methods and Techniques. Figure 2 shows that both junior and senior secondary school teachers identified mixed ability teaching, special education skills and new methods of teaching agriculture as areas of IPD need. This therefore suggests that training all teachers in these areas will be an appropriate move.

**Figure 2:** Percentages of Teachers According to Education Phase: Comparison of IPD Needs in Teaching Methods & Techniques



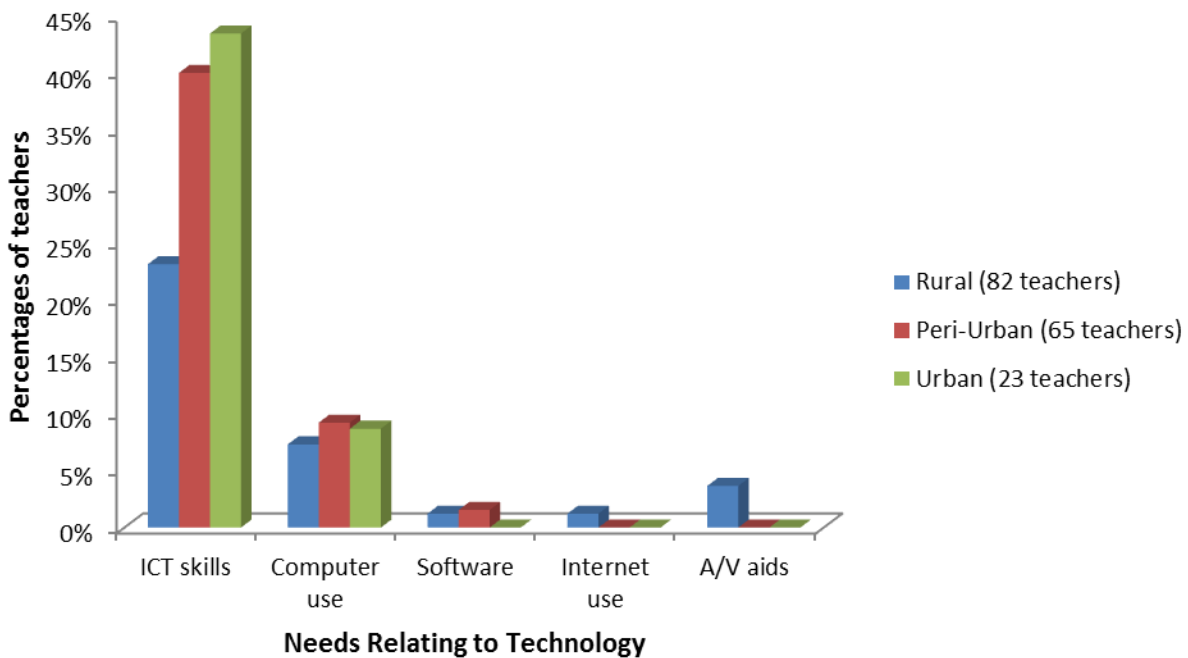
However, Figure 2 continues to reveal that the junior secondary school teachers considerably expressed more IPD need for special education skills and new methods of teaching agriculture than the senior secondary school teachers. This could mean that a considerable number of the senior secondary school teachers feel proficient in these areas. This suggests that the junior secondary teachers ought to be given more preference when it comes to the provision of IPD activities in these areas.

It should also be noticed in Figure 2 that the junior secondary school teachers identified all the seven aspects relating to teaching methods and techniques whereas senior school teachers just identified (3/7) 43% of the needs. None of the senior secondary school teachers identified conventional methods of teaching; differentiation; handling large classes; and organizing educational tours as areas of IPD need. Only junior secondary teachers, although very few, identified these aspects as areas of IPD need. This could be that the challenge associated with these aspects is relatively more intense with junior schools where the subject is compulsory to all students than at senior schools where it is an option (Ministry of

Education 2000 & 1996). It could also be a result of the difference in teachers' academic qualifications which renders the junior secondary teachers, most of whom (82%) have diploma, feel knowledge gap in these aspects than their senior school counterparts who are all degree holders and probably have the required skills. (See Figure 5 to authenticate the 82%). Furthermore, the low expressed IPD need by teachers in conventional method of teaching, differentiation, handling large classes; and organizing educational tours could be a reflection that majority of the teachers are competent in these areas hence less need for in-service training in them than it is with the rest of the identified teaching methods and techniques.

**Figure 3** below presents percentages of teachers expressed per location compared under each of the technology aspects identified by teachers as IPD needs. Generally, Figure 3 shows that all teachers irrespective of school location identified ICT skills and use of computers as areas of IPD need. This gives implication that training all the teachers in these aspects could be necessary.

**Figure 3:** Percentages of Teachers According to School Location: Comparison of IPD Needs in Technology



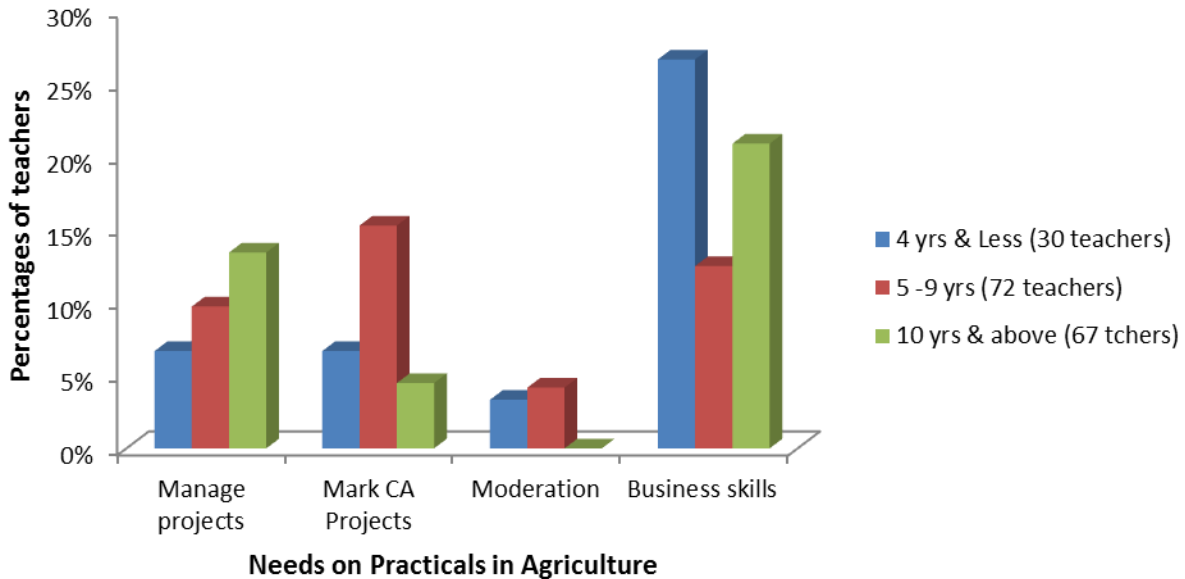
However, Figure 3 shows that the rural school teachers expressed considerably less IPD need in ITC skills than the teachers in the urban and peri-urban areas whose IPD need in this area seem to be the same. The reason for this could be that teachers in more developed areas get exposed to seeing the benefits of using new technology and therefore are more aware of the new technology than those in less developed areas.

It can also be observed in Figure 3 that there is a very low demand by the teachers for in-service training in the use of computers and their software's, use of internet and A/V aids. One reason for this finding could be that the teachers feel competent with the use of these gargets. Secondly, it could be that

there are barriers (Butler and Sellborn, 2002) that inhibit teachers to request and adopt new technology. The teachers could be finding it difficult to learn and use computers hence choosing to avoid them. Last to comment on is that Figure 3 shows that only some few rural school teachers identified audio-visual aids as an area of IPD need. This could be an indication that accessibility to advanced teaching technologies by rural school teachers is very limited hence teachers finding simple posters and overhead projectors still useful to them.

**Figure 4** below presents percentages of teachers expressed per experience group and compared under each of the IPD needs on practical aspects of agriculture.

**Figure 4:** Percentages of Teachers According to Experience: Comparison of IPD Needs in the Practical Aspects



It is apparent from Figure 4 that all teachers regardless of their years of experience identified management of marking of continuous assessment (CA) projects and business skills as areas of IPD need relating to the practical component of the subject. This implies that training all teachers in these aspects will be a welcome development. However, **Figure 4** shows that many younger and less experienced teachers saw business skills as an area of IPD need more than did the rest of the groups. This suggests that it may be appropriate to give the less experienced teachers more preference when inviting teachers to attend in-service training in business skills. This could be that the young teachers intend to acquire business skills so that they could venture into part time farming not necessarily to use the knowledge to teach.

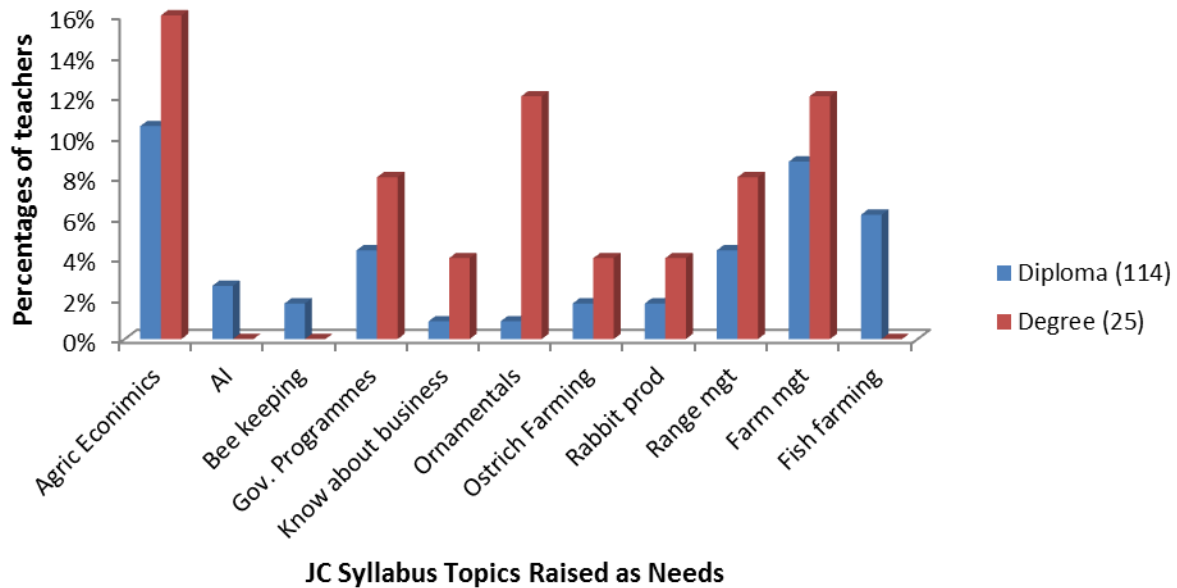
The Botswana government has introduced a fund, which is still currently enforced, for young farmers aged between 18 to 35 years, as part of its strategy to diversify economy and curb unemployment (MFDP, 2006). I find this as the possible source of motivation to the young teachers to get enriched in farm business skills and later venture into part time farming with the support of the government.

Culturally, Batswana are farming people and it has been accepted also that civil servants practice part time farming. Having been trained in agriculture, the teachers could be feeling having an advantage of meeting the requirements for acquiring the youth fund.

It can also be observed in Figure 4 that the group of the most experience teachers (i.e. 10 yrs & above) seem to be showing interest in business skills training as well as expressing IPD need on the area of managing agriculture projects. This may imply that, due to possible added responsibilities, the experienced teachers could be feeling the need to be better informed in these areas so that wherever possible they lead by example. It could also be that they want to gather skills to help them venture into farming business following retirement. Figure 4 reflects further that the moderation aspects has been identified as an area of IPD need by very few teachers of less experienced groups and none of the most experienced teachers. This could be that the majority of the teachers along experience levels feel competent with the area, in which case the training of teachers in this area may not be necessary.

**Figure 5** displays percentage of junior secondary teachers compared under each syllabus topic identified as IPD need. Figure 5 shows that all teachers regardless of academic

**Figure 5:** Percentages of Junior Secondary Teachers According to Qualification: Comparison of IPD Needs in the JC Syllabus Topics



qualification identified Agriculture Economics, Government Programmes, Know about Business, Ornamentals, Ostrich Farming, Rabbit Production, Range Management, and Farm Management as areas of IPD need. This implies that training all teachers in these syllabus topics might be necessary.

However, Figure 5 further shows that more junior secondary school teachers having degree qualifications expressed considerably more IPD need in these areas than their counterparts having

diplomas. The reason could be that their qualification makes them more aware of the importance of mastering content as teachers. Mastery of content has been indicated as one of the characteristics of an effective teacher (Ball and Knobloch, 2005). It could also be that the degree holders have difficulty in scaling down content to match the level of understanding of students at junior schools.

Figure 5 continues to show that only the junior secondary teachers identified artificial insemination (AI), bee keeping and fish farming as areas in which they need in-service training. The reason for this finding could be that the highly qualified teachers may be feeling well vested with these topics than the less qualified teachers, thus finding it unnecessary to seek in-service support to handle them. Besides just reflecting differences in the teachers' level of qualification, this could also reflect some implications on the level of emphasis laid on the topics by the teacher training programmes (i.e. diploma and degree). It could be that the diploma programmes expose teachers to these areas less than the degree programmes, thus creating a knowledge gap in the diploma holders.

### **Conclusions and Recommendations**

On the basis of the findings presented and discussed above, this paper makes the following conclusions:

The teachers of Agriculture expressed as their IPD need, areas under Teaching strategies and Subject matter categories. Details of these groups of needs are detailed in Tables 1 and 2 above. The long list of identified IPD needs increases the demand for the future IPD programme and point to implications for various stakeholders. For instance, a long list of identified subject matter needs has implications for content and quality of initial teacher training institutions which, probably due to lack of time, could not adequately address them (Kirk and Glaister, 1988; Guskey and Huberman, 1995). Given that it may not be easily affordable to address a long list of identified IPD needs, it would be helpful for the Ministry of Education through the Regional Education Office to increase the budget for teachers' IPD as well as the capacity of the supervisors. The needs also have implications for In-service providers who ought to strategically plan to ensure that all needs are addressed. It is advisable that school administrators in conjunction with the agriculture departments devise the best way teachers of agriculture could be released to attend the opportunities whenever need arises.

Regarding the syllabus topics, where topics identified as needs are not part of the current agriculture syllabuses, they could be recommended for incorporation into the curriculum to meet their possible demand in the local context.

There are differences in the patterns of IPD needs expressed by the teachers according to the levels of selected demographic characteristics of the teachers' population and school attributes. This suggests the need for targeted IPD opportunities to be arranged by IPD providers to ensure that all agriculture teachers are competent in all the identified areas related to pedagogy and agriculture subject matter: detailed in the tables above.

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