

## **Teachers of Poor Communities: The Tale of Instructional Media Use in Primary Schools of *Gedeo* Zone, Southern Ethiopia**

Mehadi Abdo  
Hawassa University, Ethiopia  
Tesfaye Semela  
University of Tübingen, Germany

*Abstract: The purpose of this study was to investigate the impact of working conditions at school on teachers' level of instructional media use in the primary school system of Gedeo Zone, southern Ethiopia. The survey was made on a sample of 139 (24.4 % female and male 75.6 %) teachers who were randomly drawn from 9 primary schools (four rural and five urban primary schools). The instruments used to generate data were self-reported questionnaires tapping the level of instructional media use and the associated school-level environmental factors. The findings based on Factor Analysis revealed three independent dimensions of school environment factors related to the use of instructional media by teachers. It is further disclosed that the level of use of instructional media is low with an average frequency of use swinging between once in two weeks to twice in three weeks during four weeks of instruction. The implications of the findings related to pre-service and in-service teacher training are also discussed.*

Integration of instructional technology in school curriculum believed to bolster the quality of instruction via fostering student-centered pedagogies (e.g., Neo 2007; Rakes, Fields, & Cox 2006; Sandholtz, Ringstaff, & Dwyer 1997). Specifically, research evidence (e.g., Gravoso et al. 2008; Egorov, Jantassova & Churchill 2007; Kadzera 2006; Rakes et al. 2006; Abdelraheem & Al-Rabane 2005; Aggarwal 1995; Nkuuhe 1995) show that teachers' use of instructional media sustain students' attention, increase the meaningfulness of abstract concepts, encourage deep processing, and boosts class performance through increased content acquisition (Baylor & Ritchie, 2002). Most importantly, it is argued that the advent of information and communication technology calls for modification of students' and teachers' roles as it triggers a shift from teacher-centered to constructivist modes of classroom instruction (e.g., Neo 2007; Rakes et al. 2006), and causes teachers to confront their established beliefs about instruction (Earle 2002). Apparently, as educational innovations change the modes of school instruction in the West, the new development is also felt in different parts of the globe including the poorest corners of the world, and Ethiopia is one of them.

Recognizing the pedagogical implications, the Ethiopian Education and Training Policy (ETP) promises to intensify the integration instructional technology in school curriculum (TGE 1994; MoE 2006). In view of that, the ETP states that: "...due attention will be given to the supply, distribution and utilization of educational materials, educational technology and facilities." (TGE 1994:86). Furthermore, the recently introduced General Education Quality

Improvement Package (GEQIP) clearly stipulates a separate ICT integration implementation program (MoE 2006: 52-54). This new move indicates the political will to facilitate the integration of instructional technology in schools. However, little or no empirical evidence exist related to teachers' role in the process of integrating instructional technology in Ethiopian school system. The limited studies conducted in the late 90s (e.g., Asegedom & Zewede 1996; Asegedom 1998; 1999; Fanta 1999) do not provide sufficient evidence since a lot has changed over the past decade partly due to the rapid expansion of primary education in Ethiopia (see: MoE 2009). Thus, updated empirical evidence is necessary to inform policy, practice, and future research.

The purpose of this study is, therefore, to examine the use of instructional media resources among primary schoolteachers in *Gedeo* Zone. Notwithstanding its limited scope, however, the findings of the present study is believed to provide some empirical evidence regarding the state of instructional media integration in school curriculum and its implications for pre-service and in-service teacher training programs in Ethiopia.

### The Study Context

*Gedeo* Zone is located in Sothorn Nations Nationalities and Peoples Regional State (SNNPRS) of Ethiopia with a population of less than one Million. The Zone is predominately inhabited by ethnic *Gedeo*, one of the 56 ethnic groups inhabiting the SNNPRS. Despite the significant increase over the past decade, *Gedeo* Zone stands at the bottom four out of 22 Zones and Special *Weredas* in terms of primary school participation (SNNPRS-EB 2009:18). The 2007/8 Education Statistics shows that the primary school Net Enrollment Rate (NER) in *Gedeo* Zone was 59.4 % with Gender Parity Index (GPI) of 0.66 (i.e. for every 100 boys enrolled, there were only 66 girls) (SNNPRS-EB 2009). This figure is smaller than both the regional (SNNPR GPI = .87) and the national average (National GPI = 0.90) (MoE 2009) depicting significant female under representation in primary education. On the other hand, despite its comparatively low NER, the number of teachers and classrooms in the Zone is dismal. In this regard, the 2007/8 statistics reveals that teacher-pupils-ratio (TPR) and pupils-section-ratio (PSR) at first cycle primary level were 73 and 75 respectively (SNNPRS-ER 2009). In short, available data and actual observations indicate that relative to most Zones within the SNNPRS, *Gedeo* Zone is one of the least resourced and less developed in terms of material and human resources, school infrastructure and facilities even by Ethiopian standards.

Hence, it is against this background that this article attempts to examine the level of instructional media use (as measured by frequency of use) among primary school teachers in *Gedeo* Zone. Specifically, the study will answer the following research questions:

1. How frequent do primary schoolteachers in *Gedeo* Zone utilize instructional media in their teaching?
2. What are the most important school-level work environment variables that matters most to teachers when they intend to use media for teaching purposes?
3. Do teachers' perceptions of their work environment variables related to their level of instructional media use?

## **School-Based Barriers of Instructional Technology Integration**

A burgeoning body of research (e.g., Afshari, Abu Bakar, Su Luan, Abu Samah, & Say Fooi 2009; 2008; Teo 2008; Neo 2007; Rakes et al. 2006; Dawson & Rakes 2003; Tearle 2003; Wang & Reeves 2003; Manson 2000; Ertmer 1999; Fanta 1999; Asegedom 1998) unraveled the array factors associated with successful technology integration in school. To put this assortment of factors in proper perspective, Ertmer's (1999) classification of barriers of technology integration appears relevant. Ertmer (1999) categorized barriers of technology integration by teachers into two broader classifications: first-order barriers 'extrinsic' to teachers (access, time, support, resources, and training) and second-order barriers 'intrinsic' to teachers (attitudes, beliefs, practices and resistance). For the purpose of this paper, reviewing some of the first-order barriers that are directly influenced by the school in the process of instructional technology integration seems appropriate. Thus, this section reviews existing literature that focus on the role of (a) availability of and access to media resources (e.g., Kardeza 2006; Dawson & Rakes 2003; Bitner & Bitner 2002), Para-professional support/technical (e.g., Grainger & Tolhurst 2005), (b) teachers' workload and nature of teaching tasks (e.g., Moore, Harrison & Donaldson 2005); and, (c) school culture and leadership support (e.g., Tearle 2003; Dawson & Rakes 2003; Manson 2000; Sandholtz et al. 1997) in teachers' instructional media integration.

### **Availability of Media and Technical Support**

Availability of and access to instructional technology resources and technical support (Fuller 2000) are important factors that determine the frequency with which teachers use instructional materials (e.g., Bitner & Bitner 2002). In this connection, Holloway (1996) suggests that the frequency with which elementary school teachers use instructional technology is related to the availability of technological hardware in the classroom, buildings and districts media centers in that order. In a survey study Kardeza (2006) reported that lack of instructional media resources are one of the reasons for minimal use of instructional technology in teachers training institution in Malawi. In an earlier study conducted in Ethiopia, Asegedom (1998) reported lack of the required instructional media resources in the one hand, and failure of school pedagogical centers to make available ones accessible on the other, as reasons for teachers' limited use of instructional media. In another study, Fuller (2000) reported that teachers are encouraged to use technology in classroom if they are given technical support.

### **Workload and Nature of Teaching Tasks**

The nature of the teaching tasks (i.e. the amount of school subjects taught, the number of students in class, time constrain during planning, and the weekly teaching load) is also cited as a major factor influencing much of what teachers do in their classrooms (e.g., Moore et al. 2005; Earle 2002; Arends 1997; Betz 2000). In this connection, Moore et al. (2005) reported that teachers resent assignments requiring them to teach subjects they do not know, entail considerable time for class preparations, or teaching very large classes. In a comprehensive review of research, Earle (2002) identified shortage of 'planning time' among teachers as one of the major restraining factors of technology integration in school. Further. it is to be noted that leave alone in situations where class sizes are already large, and physical space is limited and

substandard (e.g., Bitew 2008; Semela 2003), that teachers are reluctant to immediately integrate technology in their teaching even when both first-order (extrinsic) and second-order (intrinsic) barriers have been removed (Ertmer 1999: 51). Thus, considering the inherent complexity of technology integration, Wang and Reeves (2003) recommend that instructional designers and researchers need to seriously consider teachers' perspectives while attempting to integrate instructional technology in schools.

### **School Culture and Leadership Support**

There is evidence to suggest that that leadership is one of the most important factors affecting the successful integration of technology (e.g., Afshari et al. 2008; Dawson & Rakes 2003; Tearle 2003; Manson 2000). In a study conducted in British school system, Tearle (2003) found that the school culture and the principal's 'strong leadership' are important in ICT implementation. Consistently, related studies (e.g., Dawson & Rakes 2003; Betz 2000; Manson 2000) concluded that principal's support encourages teachers to use technology in the classroom. Asegedom (1998; 1999) endorsed the role of school principals in encouraging or discouraging the use of media by teachers in Ethiopian school system. Parker (1999), on the other hand, noted that technophobia among principals can hold back successful IT (Information Technology) implementation in school. Taken together, the existing literature on school-based or extrinsic factors (e.g., Ertmer 1999) that affect teachers' use or integration of instructional technology provides empirical as well as substantive evidence that availability of and accessibility of instructional media/technology, teachers' workload, planning time and teaching tasks (as related to time constraint) (e.g., Moore et al. 2005; Earle 2002; Betz 2000; Arends 1997), and the support of school leadership (Dawson & Rakes 2003) and technical support (Fuller 2000) impinge on teachers' use of instructional technology in classroom. Similar findings were reported in earlier studies conducted in Ethiopian context (e.g., Asegedom 1998; 1999).

## **Methodology**

### **Participants**

The participants in this study were selected from a population of 697 primary school teachers in *Wenago* Wereda. The identification of the study site was made based on lottery method out of the four Weredas in *Gedeo* Zone. The sample included 150 teachers, who were drawn using a systematic random sampling technique the nine target schools (four rural and five urban primary schools). The sample accounted for 21.5% of primary school teachers in the Wereda. Of the 150 initial participants, however, usable data were obtained on 139 (Female = 24.4 % and Male = 75.6 %) teachers whose mean age was 37.5 (SD = 7.2) years and average teaching experience of 8.6 years (SD = 4.2 years). The total response rate was 92.6%. The proportion of response was considered to be high, thus, acceptable for further analysis (Wiersma 2000).

## **Instruments**

A questionnaire was developed based on an in-depth review of the existing literature on instructional media use among school teachers and prior school visits. To that effect, two types of instruments were developed by the researchers. These were: teachers' perception of their Level of Media Use (LMU) (as measured by the frequency of instructional media use) and teachers' evaluations of their working environment (TEWE).

### *Teachers' Perception of their Level of Instructional Media Use*

The LMU scale asked the respondents to indicate the type and the frequency of instructional media items over one month period of classroom teaching. Eight types of instructional media materials were identified based on visits to schools, informal talk with school principals and teachers, and a syllabus analysis. Thus, eight items were developed to assess the level of media use by the teachers. These included: (1) teacher-made instructional materials including drawings, diagrams, handouts, and other materials; (2) still pictures (3) three-dimensional instructional materials including models, mock-ups, globes and real objects; (4) two-dimensional instructional materials such as maps, charts, graphs; (5) display boards; (6) motion projected media such as video or television; (7) audio materials such as radio and tape materials; and (8) flash cards, posters, and cartoons. A seven-point Likert scale was used for each media item; ranging from "every day" to "not at all" [i.e. every day = 7, twice a week = 6, once a week = 5, once in two weeks = 4, once in three weeks = 3, once in four weeks = 2, and; not at all = 1]. The level of instructional media use (LMU) was determined by summing up teachers' ratings across the eight items for each individual respondent. The maximum possible score in this scale was  $8 \times 7 = 56$ ; while the minimum possible score was  $8 \times 1 = 8$ . High score on the scale indicates high level (frequency) of instructional media use.

### *Teachers' Evaluations of their Working Environment*

The second instrument was designed to investigate teachers' perception and evaluation of their work environment. This measure contained questions pertaining to school-level factors/variables that influence their instructional media use. There were 10-items measuring the TEWC. The respondents were expected to indicate their assessment of the school-level factors/variables as they relate to their use of instructional technology. All items were measured along a five-point Likert-type scale that ranged from "Strongly agree" (5 point in the scale) to "Strongly disagree" (one point in the scale). High score on the TEWC measure indicates positive or favorable working conditions within the school environment. Scores on negatively stated items were reverse coded before analyzing the responses.

### *Instruments Development*

The two instruments employed in this study were subjected to initial item screening for content and logical validity by seven experts. Four of these experts were selected from the Department of Curriculum in the Southern Nations Nationalities Administrative Region Education Bureau (SNNPAR-EB) while the remaining three were postgraduate students in the

Department of Curriculum and Instruction at Addis Ababa University. Based on their feedback, some modifications were made to improve the quality of the items. Following that, a tryout data collection was made on 40 primary teachers. Finally, nine items were eliminated from the major data collection instruments due to low logical validity and marginal total-item correlation. Internal consistency reliabilities (Cronbach alpha) for the final versions of Level of Media Use (LMU) and Teachers' Evaluations of their Working Conditions (TEWC) scales were found to be 0.71 and 0.68 respectively. All items included in the questionnaire were written in Amharic language in order to avoid communication barrier.

### *Data Analysis*

Data were analyzed using descriptive and inferential statistics. Descriptive statistics (Means and SDs) was used to analyze the data generated through the LMU measure. The remaining 10 items that made up the TEWC measure was subjected to Factor Analysis, a statistical technique that helps to identify items tapping the same construct (Brymen & Cramer 2005). Extraction of environmental factors was made using principal component analysis and rotated employing a Varimax rotation procedure. The justification for employing the Varimax rotation option was to identify the set of items tapping the different factors of work environment (Brymen & Cramer 2005).

The sampling adequacy of the measure was checked based on Kaiser - Meyer - Olkin (KMO) sampling adequacy measure. Accordingly, KMO was found to be 0.763 (with Bartlett's test of sphericity = 247.78,  $p < .0001$ ). This indicates that the sample size considered to run the analysis was adequate. In addition, in order to determine the number of factors to be retained, using the Kaiser Criterion was employed (SPSS Advanced User's Guide, 1990). Accordingly, three factors with Eigenvalues greater than 1 were retained. The three work environment factors collectively accounted for about 79.8% of the total variance. Further, a Pearson coefficient of correlation was computed to find bivariate relationships between the dependent (Level of Media Use) and the independent variables (Work environment factors). All statistical significance tests were made at alpha 0.05. Data entry and analysis was made using the SPSSWIN version 11.

### **Results**

As stated earlier, the level of media use (LMU) was assessed based on teachers' responses to the questions regarding the frequency with which they used instructional technology during their teaching work. The mean frequency of use among teachers for all types of instructional materials considered in this investigation is depicted in Figure 1 below.

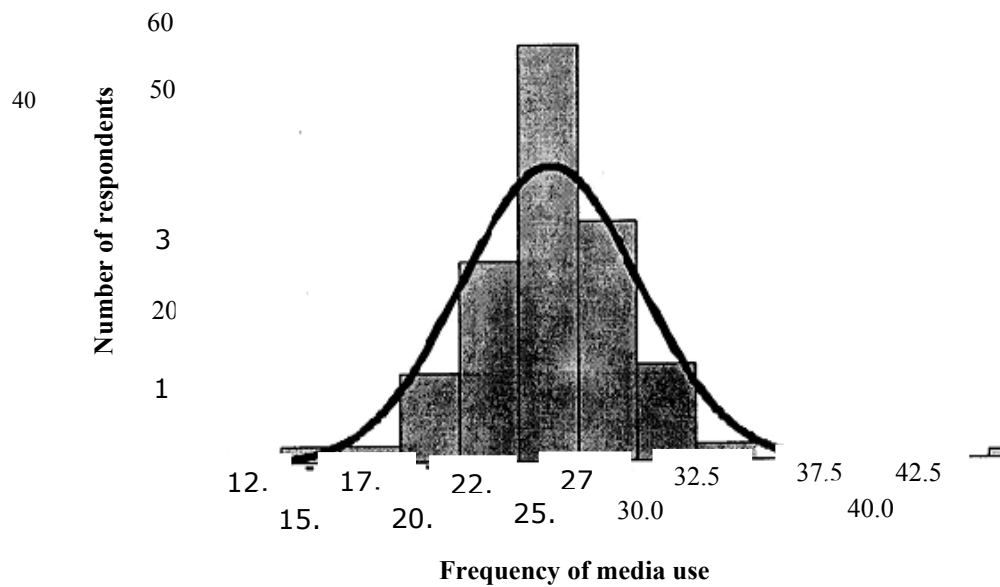


Figure 1. Teachers' frequency of media use

Figure 1 portrays that generally, the majority of the teachers do not frequently use media in the actual teaching-learning situation. The computed overall mean of the level (frequency) of media use (LMU) is 25.1 (Mean = 25.1, SD = 3.73, N= 139). This qualitatively implies that teachers, on average, use media resources between once in two weeks to once in three weeks of the instructional time for each media type. In other words, over one month of classroom instruction, the significant majority of the teachers did not even use media once in a week. Figure 2 further illustrate the frequency of media (y-axis) use (LMU) and the corresponding proportion of teachers (X-axis). Accordingly, of the total of 139 teachers, 54 (38.8%) reported to use media only twice in three weeks while two (1.4%) of them admitted to have employed only once in a week.

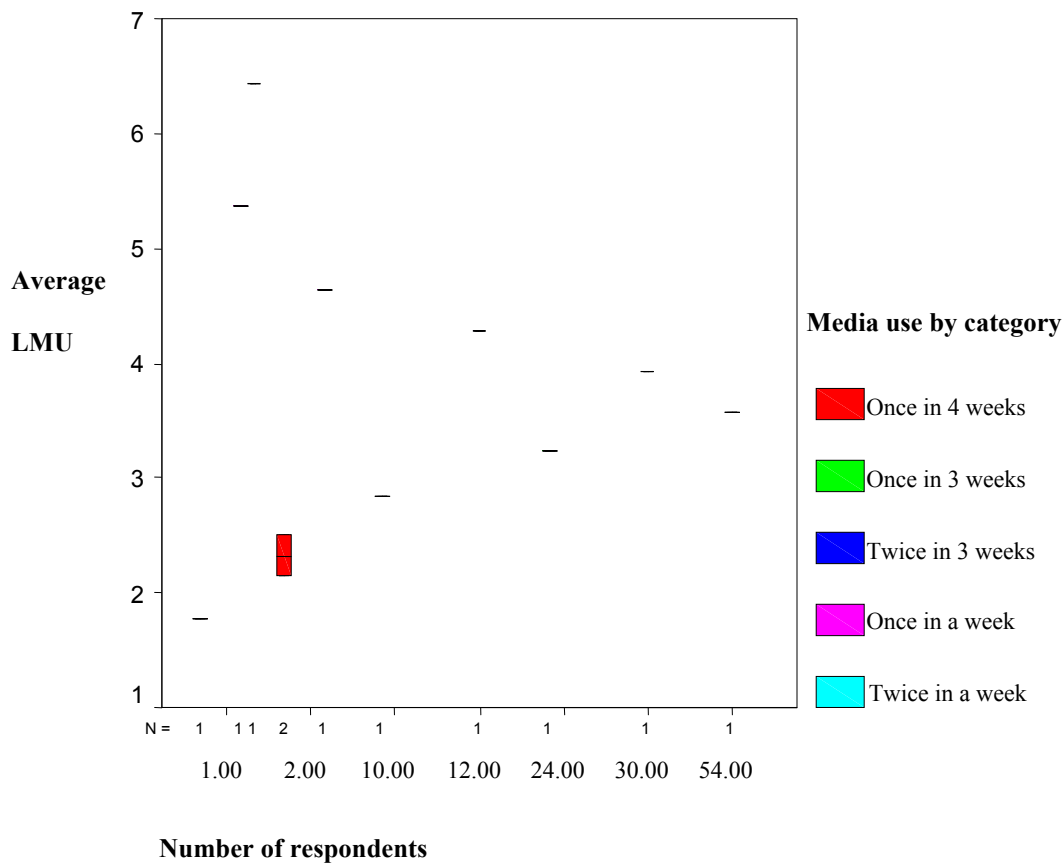


Figure 2. Average level of media use (LMU)

**Analysis of School-Level Factors Related to Instructional Media Use**

In order to determine the school-level factors affecting teachers’ use of instructional media, a factor analysis technique was employed to identify items that represent different dimensions of the work environment. The factors emerged from the analyses then rotated using the Varimax option to determine the independent school work environment factors affecting instructional media use. The results are presented in Table 1 below.



Item No.	Factor Loadings	Work Environment Measure
<b>Factor I: Availability of Media Resources</b>		
10	.56	In my school Paraprofessional support in easily obtainable.
4	.57	In my school, ready-made instructional materials are available.
7	.83	Available school media are easily accessible.
8	.79	Local materials that are needed for media preparation can easily be obtained
<b>Factor II: Manageability of Classroom Tasks</b>		
1	.56	My weekly teaching load is reasonable.
3	.75	The class-size is appropriate for my instructional tasks
9	.63	Classroom physical conditions are comfortable.
<b>Factor III. Administrative support and encouragement provided by the school principal</b>		
2	.85	The school administration assigns fair and reasonable co-curricular assignments.
5	.44	The school principal is supportive in the design and implementation of the school media policy and rules
6	.35	The school /the principal provides adequate media storage and preparation space

\*KMO- measure of sampling adequacy = .7633, Bartlett's Test of Sphericity = 247.78,  $p < .0001$

**Table 1. Factor loadings of the rotated work environment factors**

As can be seen from Table 1, there are three dimensions/factors of the school environment that matters most to school teachers when integrating instructional media materials. Factor I characterize teachers' perception of the school environment with regard to the availability of instructional media resources (human and material resources) within their school, which we called: "Availability of Media Resources" (AMR). Factor II represent the extent to which teachers' assess the appropriateness and manageability of their teaching tasks or teaching assignments within the classroom/school settings which is referred here as "Manageability of Classroom Tasks" (MCT). The third dimension that emerged as Factor III represents teachers' perception of the level of administrative support and encouragement provided by the school leadership which is identified as "Administrative Support" (AS).

A minimum of three or four items were represented under each of the main school environment factors. Factor I included four items (items 10, 4, 7, and 8) in relation to the teachers' perception of the school environment with regard to the availability and accessibility of instructional media resources (human and material resources) within their school settings. One item represented this dimension with regard to the availability of human resources that can facilitate the use of media within the school settings was: "In my school, paraprofessional support is easily obtainable from media personnel". Another item representing the same dimension yet with regard to the availability of material resources in the school environment was: "In my school, ready-made instructional materials are available in sufficient number".

Factor II represent the extent to which teachers' assess the appropriateness and manageability of their teaching tasks or teaching assignments within the classroom/school

settings. It is represented by three items (items 1, 3 and 9). All the items under this Factor solicited the respondents to assess the appropriateness and manageability of their teaching tasks including the class-size, weekly teaching load, and physical conditions needed to use media in the classroom.

The third dimension that emerged as Factor III represents the teachers' perception of the level of administrative support and encouragement provided by the school principal. This factor is represented by the remaining three items (items 2, 5, and 6). This dimension include items such as "The school principal is supportive in the design and implementation of the school media policy and rules", "The school administration assigns fair and reasonable co-curricular assignments", and "The school /the principal provides adequate media storage and preparation space."

**Relationships between School-Based Factors and Level of Teachers' Media Use**

Having identified the three dimensions of the work environment variables, it is attempted to uncover a bivariate linear relationship between LMU and the school-based environmental factors related to teachers' use of instructional media resources. The Pearson coefficient of correlation computed between LMU and the three work environment factors is presented in Table 2 below.

Criterion Variable	Mean	SD	r
Level of Media Use (LMU)	25.53	3.79	-
<i>Environmental Factors</i>			
Availability of Media Resources (AMR)	10.53	3.30	.18**
Manageability of Classroom Tasks (MCT)	9.01	2.86	-.01
Administrative Support (AS)	9.71	2.51	.073*

\* p < .10, \*\* p < .05

**Table 2. Means, SD, and correlation coefficients of work environment factors with LMU**

As depicted in Table 2, level of media use (LMU) was significantly correlated ( $r = .18, p < .001$ ) with availability of media resources (AMR). In addition, administrative support (AS) moderately correlated ( $r = .073, p < .10$ ) with level of media use (LMU) even though not correlated to the accepted level. On the contrary, manageability of classroom tasks did not produce statistical significance with level of media use.

## Discussion and Conclusion

The purpose of this study was to assess the extent to which teachers' employ instructional media resources in the primary schools of *Gedeo Zone* in southern Ethiopia. Although a wide array of instructional media items can be used by school teachers, this study has focused on eight types of instructional media materials identified earlier in the methodology section. Accordingly, the use of instructional media resources is found to be infrequent among primary school teachers as can be discerned from the observed mean (Mean = 25.12, SD = 3.73). This finding is in agreement with previous studies conducted in other regions of Ethiopia (e.g., Asegedom 1998; 1999; Fanta 1999) and recent study among tutors of teacher training colleges in Malawi (Kadzera 2006). Thus, considering earlier works of Asegedom (1999) and Fanta (1999) who reported infrequent use of instructional media by school teachers in Ethiopian context, it can be argued that little attention is going into integration of instructional technology. Notwithstanding a policy direction for student-centered and problem-solving pedagogies, *y* (ETP 1994), the finding shows little has changed decades since the Education and Training Policy (TGE 1994) came into force. This apparently calls for a renewed policy attention to redress the unwelcome consequences of failure to integrate technology on the quality of education.

### Dimensions of School-Based Factors Related to Instructional Media Use

According to the factor analysis, one of the school environment dimensions which is found to matter most to school teachers is availability and accessibility of instructional media. This finding is in agreement with results of previous studies (e.g., Bitner & Bitner 2002; Kadzera 2006) which reported that teachers need to have instructional technology at their disposal to apply them in classroom teaching learning. Further, the statistically significant linear association between Level of Media Use (LMU) and Availability of Media Resources (AMR) shows the existence a systematic relationship. In other words, the finding demonstrates that the quantity and quality of available materials within a given school environment may have a positive or negative influence on the degree to which media are utilized. In this regard, Asegedom's (1998) reported that the unavailability of instructional materials is one of the greatest obstacles affecting teachers in Ethiopian schools. Thus, it can be concluded that infrequent use of media among Ethiopian school teachers can be partly attributed to the shortage of appropriate instructional media resources, including lack of technical personnel, facilities, and the necessary infrastructure. In view of this, the finding that identifies instructional media resource availability as significant variable related to teachers' use of technology resources is not surprising since a resource shortfall is commonplace in both rural and urban primary schools in Ethiopia (e.g., Bitew 2008; Semela 2003). Unlike in adequately resourced schools of the developed world, actual experience in *Gedeo Zone* classrooms presents a scenario whereby even finding a functioning classroom doors and windows is a luxury. Thus, leave alone ICT infrastructure, a well maintained chalkboard and classroom furniture is a very rare phenomena. Thus, it is hard to argue that availability of media resources does not affect teachers' use of it.

Manageability of Classroom Tasks (MCT) is the other critical factor which is found affect teachers' use of instructional media. Nevertheless, the bivariate correlation between MCT and LMU reveals no linear association. This implies that the frequency with which teachers use media in classroom was not impacted by teachers' workload, time constraint, class size, and the physical conditions of the classroom such as availability of space to use instructional media. This

is contrary to our expectation as well as assertions made in earlier studies (e.g., Arendes 1997; Holloway 1996) that claim infrequent use of instructional technology is associated with lack of teachers' planning time (e.g., Ertmer 1999; Earle 2002) and space needed to select, prepare, modify, and integrate instructional media (e.g., Arendes 1997). Hence, in the presence of compelling evidence as to the importance of MCT in impacting LMU, it may be imprudent to completely ignore previous findings simply because contradictory result is obtained in the present study. Thus, it is important to conduct further research using both qualitative and quantitative methodologies to arrive at conclusive results.

The third dimension that teachers' viewed as a key factor impinging on instructional media use is the level of administrative support and encouragement provided by the school principal (AS). The finding has a considerable empirical support from earlier works in Western culture (e.g., Betz 2000; Manson 2000; Dawson & Rakes 2003; Tearle 2003) as well as a survey study carried out in Northern Ethiopia (Asegedom 1998). In the present investigation, however, teachers' perception of the level of administrative support (AS) provided by the school leadership was positively but not significantly related to their frequency of instructional media use. Though the present study failed to offer strong evidence, a number of studies (e.g., Descy 1999; Manson 2000; Dawson & Rakes 2003; Tearle 2003) indicate that teachers' ability of technology integration in classroom is affected by the strength of school leadership (Tearle 2003) and administrative support (Dawson & Rakes 2003). In agreement with the assertion of Western scholars, Asegedom's (1998) study in Northern Ethiopian primary schools confirmed that school leadership is critical in facilitating instructional media use. In the context the present study, school principals fully control instructional resources, personnel, and finance to procure new materials and equipments. Hence, it can be argued that little can be achieved (and much might be lost) without their endorsement and active support. Therefore, the degree to which a school principal offers or deprives teachers' instructional opportunities shapes their decision to engage or not to engage in a teaching task.

In a nut shell, notwithstanding the need for a comprehensive research, each of the three school environment factors identified in this study deserve due heed in policy and practice during technology integration in the school curriculum. Obviously, the identified factors represent simply, the 'tip of an iceberg' of challenges that confront the process of education in Ethiopia. To get a detailed and comprehensive data on technology integration in schools, there is a need for a nation-wide research on what Ertmer (1999) referred as first-and second-order barriers of technology integration in Ethiopian schools.

### **Implications**

On the bases of the findings of this investigation, despite its limitations in its scope and the methodology employed, the following implications can be identified:

- Strengthening the capacity of primary schools in terms of finance, material and human resource to acquire the necessary instructional media resources and ICT.
- Offer pre-service and in-service teacher training for primary teachers on the use and preparation of relevant instructional media resources and ICT.
- Develop the technical capacity of school pedagogical centers to provide technical support for teachers on day-to-day bases.
- Making instructional media part of school principal training, developing school level policy and guidelines for optimum use of instructional media resources and production of

the same from local materials in school pedagogical centers with the participation of teachers and students.

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