

## Exploring the Learning Styles of Students in Ethiopian Public and Private Schools and at University

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**ABSTRACT** Teaching in Ethiopia had to change from passive, teacher-centered instruction to active, student-centered methods while also considering the students' current learning style preferences. This study therefore aimed to determine the learning style inclinations of students in grade 10 and at university in terms of being balanced, moderate or strong on each of the four dimensions of the Felder-Silverman's Index of Learning Styles (ILS), namely active-reflective, sensing-intuitive, visual-verbal and sequential-global. A second aim was to investigate if the students had statistically significant preferences for certain learning styles over others if the four dimensions were compared simultaneously. To this end, the ILS questionnaire was implemented with 920 students in grade 10 public and private schools, and at second year university level. The results indicated preferences and significant differences between the groups. The study made recommendations for improved teaching, which are relevant to all developing countries.

### INTRODUCTION

Young democracies need citizens who can think critically in order to be able to actively and appropriately participate in developing their economies and forms of government. Student-centered teaching is required that will facilitate active learning (Felder in Felder and Brent 2009; Weimer 2013) in line with the constructivist epistemology (Yilmaz 2008). The constructivist perspective considers that the students actively and individually acquire knowledge from the experiences they had. The teachers provide the students with problems that are relevant in their lives and that are appropriate to the content that is being taught. In investigating possible solutions to the problems the students creatively construct their own knowledge, often in cooperation with others such as their peers or teachers (Schulze et al. 2016).

For effective teaching and learning to take place the teachers need to, in addition to ensuring a constructivist classroom, consider the students' learning styles. By accommodating a wide variety of learning styles or the learning styles

of the majority of the students in the class, the teachers can improve the students' learning and academic achievement (Bas and Beyhan 2013). However, the relationship between a learning style and achievement is complex since it is influenced by, among others, demographic variables such as the students' gender and age, the relevant subject and the school culture (Schulze et al. 2016), as well as time spent studying and career goals (Farkas et al. 2016). Students in fields such as engineering also adopt different learning styles than social sciences students, while culture also plays a role (Hill et al. 2016). On the other hand, in a study undertaken with statistics students at a United Arab Emirates University, no statistically significant dependencies were found between demographics and learning styles with the exception of the sensing-intuitive and active-reflective dimensions, and with respect to private and public high schools (Yousef 2016).

Considering the importance of moving to more effective teaching and learning, the government of the Federal Democratic Republic of Ethiopia accepted a new curriculum for reconstructing the education system from being teacher-centered to being active and student-centered (Ministry of Education [MOE] 2003). After the paradigm shift, however, the achievements of the students were very poor at the different levels. This was especially true in the case of the university students who found it difficult to part with their old learning styles (Kenea 2009; Mhr-

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ka et al. 2009), causing many faculties to once again resort to the traditional teaching methods (Van Deuren et al. 2016). This situation indicated a need to consider the preferences of the learning style of the students in the transformation of the education system in aid of more effective learning. The main aim of the study was thus, to investigate the learning styles of the students at public and private schools and at university.

### Learning Style Models

Allcock and Hulme (2010) state that taking learning styles into account allows teachers to identify and address students' needs and creates an awareness of the wide range of teaching methods that are available for successful learning. However, enquiries into learning styles are complex since students' styles may change considerably as they progress from primary school, through adolescence to adulthood (Schulze et al. 2016). In addition, learning styles are partly affected by inherited ability, previous experiences and the teachers' teaching styles (Felder and Henriques 1995). Nonetheless, a number of models have been developed of different learning styles.

Some of the most popular and influential models/theories on learning styles seem to be those of Dunn, Kolb, and Felder and Silverman (Duff 2004; Kayes 2005; Wang et al. 2006; Hawk and Shah 2007). A comparison of these learning style models indicates that similar constructs are often used even though they may be labeled differently. For example, both Felder and Silverman (1988) and Kolb use active/reflective dimensions in their models (Felder and Spurlin 2005). The global-analytic dimension of the Dunn (2003) model is also somewhat similar to the sequential-global dimension of Felder and Silverman (1988).

Very briefly, the Dunn and Dunn (in Dunn 2003) learning style model is classified into five major categories. These are environmental construct (for example, sound and light), emotional construct (for example, motivation and responsibility), sociological dimension (for example, preferences for studying alone or in pairs/groups), physiological component (for example, perception and mobility), and psychological dimension (for example, global-analytic and impulsive-reflective processors) (Dunn 2003). Us-

ing one or two of the five styles would be the best way for that person to learn new and difficult information (Penger and Tekavcic 2009).

Kolb (Duff 2004; Kolb and Kolb 2005) viewed learning as a process where the students sequentially passed through four phases, namely, concrete experience, reflective observation, abstract conceptualization, and active experimentation. From these four phases, Kolb formulated two orthogonal dimensions of learning, namely, the 'grasping experience' dimension, which is constructed from concrete experience and abstract conceptualization, and the 'transforming experience' from reflective observation and active experimentation. During learning, students start to use two modes of learning over the others. This is their preferred learning style.

The Felder-Silverman model (Felder and Henriques 1995; Felder 1996) has been selected for this study because of its popularity in the academic world (Yousef 2016), its practical usefulness for classroom teachers and its comprehensiveness regarding learning styles. The model consists of the following four dimensions:

- ♦ The active-reflective dimension: 'Active' students learn by trying things out, and are interested in working with others, while 'reflective' students learn by thinking things through, and favor working in isolation or with a single known partner.
- ♦ The sensing-intuitive dimension: 'Sensing' students are concrete thinkers, practical, and oriented toward facts and procedures, while 'intuitive' students are more abstract thinkers, innovative, and oriented toward theories and basic meanings.
- ♦ The visual-verbal dimension: 'Visual' students favor visual displays like pictures, charts, graphs and demonstrations, or any other visually-presented material, while 'verbal' students enjoy written and articulated explanations (Felder and Henriques 1995; Felder and Soloman 1998).
- ♦ The sequential-global dimension: 'Sequential' students prefer linear thinking processes and learning in small ascending steps, whereas 'global' students are holistic thinkers, and learn in large leaps (Felder and Spurlin 2005).

From the above, Felder and Silverman (in Felder 1996) developed an instrument to help teachers classify students into the four dimensions, namely, the Felder-Silverman Index of

Learning Styles (ILS). Each of the four dimensions is divided into strong, moderate or balanced sub-categories. Students who prefer the 'strong' category of the dimension may face difficulty in learning in a situation other than that situation. Students who prefer the 'moderate' category of the dimension may more easily learn in a situation that favors this dimension. Finally, students who identify themselves as 'balanced' can learn in a fairly well balanced manner from the two extremes of the dimension. According to the researchers, a 'balance' of the two is desirable. For example, while activity requires forethought, students who spend too much time thinking, may not perform the activity at all (Felder and Soloman 1994, 1998). This brings to question how teachers could accommodate different learning styles in the classroom.

### **Learning Style Research: Significant Findings**

Many researchers believe that a consideration of learning styles in the classroom can facilitate effective learning (Graf et al. 2009). Academic achievement as well as the students' self-confidence can improve when curricula are designed in consideration of the learning styles of the students (Reid 2005; Sadeghi et al. 2012). Achievement also improves because the students' motivation and engagement in the learning content increases (Reid 2005; Prashnig 2006; Graf et al. 2009; Daghani and Akkoyunlu 2012; Bennett 2013).

However, even though teachers may want to consider students' individual mental abilities and learning styles, it would be impractical to provide individualized instruction in large classes. Moreover, the effect of learning style-matched instruction is not clear-cut (Roberts and Newton 2001). This is because of the complexity of the teaching-learning process. Learning is influenced by many factors such as gender, the subject matter, the learning context and the students' prior knowledge. Thus, a learning style, which is effective for some students, is not equally effective for others (Reinert 2002). A sudden introduction of unfamiliar teaching methods could also lead to conflict with the developed learning style of students (Felder and Silverman 1988; Felder and Henriques 1995). This implies that learning styles needed to be determined and

then gradually improved, if necessary, for effective learning. One way to determine learning style is by means of the ILS, a model that has already been alluded to.

The ILS has not yet been used in studies in the Ethiopian education context, as determined by a literature review. Internationally, the ILS (or versions thereof) has been used in the field of engineering (Livesay et al. 2002) and business economics (Van Zwanenberg et al. 2000), among others. For example, a study conducted at the University of Sao Paulo with first year mechanical engineering students, showed that forty-five percent were sequential, forty-seven percent were reflective, fifty-five percent were global, sixty-seven percent were sensing, and eighty-four percent were visual students (Kuri and Tiruzzi 2002). Research with second year engineering students at Tulane indicated that forty-eight percent were sequential, sixty percent were sensing, sixty-two percent were active, and eighty-eight percent were visual students (Livesay et al. 2002). Focusing on gender differences in learning style in particular, D'Cruz et al. (2013) found no significant differences between the learning styles of male and female medical students in Tamil. At AMA International University at Bahrain, with first year students, Gappi (2013) found that the majority was fairly well balanced on the four dimensions of the ILS.

As noted, learning styles are influenced by teaching methods. In the context of Ethiopia, research on this issue is limited. One study at Addis Ababa University indicated that lecturers in the Department of Business Education generally used the traditional lecture methods, which facilitated passive learning in students (Aga 2005). In addition, the education system in Ethiopia was dominated by teacher-centered instructional methods (Kenea 2009). This was related to a lack of resources, large class sizes, poorly written textbooks, and the low language proficiency of the teachers. This implies that the learning styles of students at private schools and at public schools may differ since there were more resources at private schools and the quality of the teachers were also better owing to better remuneration than in public schools. One Ethiopian study with mathematics students used the Dunn and Dunn learning style questionnaire and not the ILS questionnaire (Geche 2009), and hence those results are not relevant to this study.

### Research Questions and Aims of the Study

The above exposition indicated that teaching in public and private schools could differ, and that age could influence learning style. Thus, the researchers involved Grade 10 students from public and private schools, as well as second year university students. Grade 10 students were selected to allow for a relatively wide gap between the primary and the secondary school levels, and second year university students were involved to allow the students enough time to adapt to university life and learning in higher education. The investigation was governed by the following two research questions:

- (i) What are the learning style preferences of students at Grade 10 public and private schools and at second year university level in terms of being balanced, moderate or strong if each of the four dimensions of the ILS was considered separately?
- (ii) Do the students have statistically significant preferences for certain learning styles over others when the four dimensions of the ILS are considered simultaneously?

It was hypothesized that Grade 10 public and private school students, as well as second year university level students would have significant preferences for certain learning styles above others on the four dimensions of the ILS.

The aims of the study were to investigate the above questions and point out the implications for teaching. This was done by means of the following research design.

### METHODOLOGY

#### Research Design, Sampling and Data Collection

The study was a randomized cross-sectional survey, using the ILS questionnaire. It was a non-experimental research design as is often used in the social sciences to gather information from a relatively small sample of the population (McMillan and Schumacher 2014). Sampling was done as follows. Hawassa has 21 secondary schools (7 public and 14 private schools) and one university. The study used purposive sampling to ensure the involvement of students from all relevant groups. In addition, the research

employed random sampling to select 400 Grade 10 public secondary school students, 249 Grade 10 private school students, and 271 second year university students in the social sciences, and therefore, 920 respondents in total.

The first section of the questionnaire determined the students' biographical data. The next section investigated their learning styles by means of the ILS (44 questions) developed by Felder and Silverman. The questionnaire was developed on the basis of the model of eight variables constructed on four dimensions as noted (active-reflective, sensing-intuitive, visual-verbal, and sequential-global). Eleven items were set for each of the four dimensions. The students responded to each item by selecting one of two options. For example, for the item "I understand something better after..." the students could choose between 'I have tried it out' or 'I have thought it through.'" Felder and Solomon (1994) indicated the interpretation for each dimension as follows:

- ♦ If the score on a scale is 1-4, the respondent is fairly well balanced on the two dimensions of that scale.
- ♦ If the score on a scale is 5-8, the respondent has a moderate preference for one dimension of the scale and will learn more easily in a teaching environment, which favors that dimension.
- ♦ If the score on a scale is 9-11, the respondent has a strong preference for one dimension of the scale. The respondent may have real difficulty in learning in an environment, which does not support that preference.

#### Ethics, Validity and Reliability

Before the study commenced, permission was obtained from all relevant parties. This included the authors of the questionnaire, the university and schools involved, parents/guardians and the students themselves. This facilitated ethical clearance from the College of Education at the University of South Africa.

Both content and face validity were judged favorably by the researchers. The Cronbach's reliability coefficients of the instrument were between 0.664 and 0.7, and all the coefficients were significant at 0.5 level.

### Data Analysis

The hypothesis stated above was tested by means of chi-square analysis. To run the chi-square tests on the Statistical Packages for the Social Sciences (SPSS) version 20, both cross-tabulation and non-parametric Chi-square tests were employed with the data of the different groups (grade 10 public and private school students, and second year university students). The learning styles of the groups were determined in terms of being active-reflective, sensing-intuitive, visual-verbal and sequential-global, and the hypotheses determined to what extent preferences were significant. The results are presented in six tables and explained very briefly. A critical discussion and interpretation of the results follows in the section thereafter.

### RESULTS

Table 1 illustrates to what extent the learning style preferences of the 400 grade 10 public school students on the four dimensions separately were strong, moderate or balanced.

Table 1 indicates that the vast majority of between sixty-five and eighty-two percent of the students in grade 10 public schools preferred the *balanced* category of the ILS dimensions for all four dimensions when these were considered separately. This means that they were balanced in their preferred learning style between being active-reflective (82%), sensing-intuitive (70%), visual-verbal (65%) or sequential-global (69%). The second strongest preference was for the moderate sub-categories of the four dimensions. Noteworthy is the moderate preference for a verbal rather than a visual learning style (23% versus 8%). The strong sub-categories of all the dimensions were preferred by only one percent to three percent of the sample.

**Table 1: The learning styles of Grade 10 public school students**

| <i>Learning style</i>    | <i>Category</i>     | <i>Frequency</i> | <i>Percent</i> |
|--------------------------|---------------------|------------------|----------------|
| <i>Active-Reflective</i> | Balanced            | 328              | 82             |
|                          | Moderate active     | 40               | 10             |
|                          | Moderate reflective | 30               | 8              |
|                          | Strong reflective   | 2                | 1              |
| <i>Sensing-Intuitive</i> | Balanced            | 278              | 70             |
|                          | Moderate intuitive  | 65               | 16             |
|                          | Moderate sensing    | 44               | 11             |
|                          | Strong intuitive    | 9                | 2              |
| <i>Visual-Verbal</i>     | Strong sensing      | 4                | 1              |
|                          | Balanced            | 258              | 65             |
|                          | Moderate verbal     | 92               | 23             |
|                          | Moderate visual     | 30               | 8              |
|                          | Strong verbal       | 13               | 3              |
| <i>Sequential-Global</i> | Strong visual       | 7                | 2              |
|                          | Balanced            | 277              | 69             |
|                          | Moderate global     | 68               | 17             |
|                          | Moderate sequential | 44               | 11             |
|                          | Strong global       | 8                | 2              |
|                          | Strong sequential   | 3                | 1              |

With regard to the hypothesis, Table 2 illuminates to what extent the public school students' preferences were statistically significant, when the dimensions were considered simultaneously.

Table 2 indicates that the preference of grade 10 public school students were significant on the one percent level for intuitive, verbal and global learning styles rather than for sensing, visual and sequential styles:  $\chi^2$  (df=1) = 12.25,  $p < 0.01$ ;  $\chi^2$  (df=1) = 34.81,  $p < 0.01$  and  $\chi^2$  (df=1) = 6.76,  $p < 0.01$ , respectively. However, their preference for an active rather than a reflective learning style was not as strong but still significant on the five percent level:  $\chi^2$  (df=1) = 4,  $p < 0.05$ .

Table 3 illustrates the preferred learning styles of the 249 students at grade 10 private schools.

Similar to the public school students, Table 3 shows that the majority of the 249 students

**Table 2: The significance of the preferences for specific learning styles of the Grade 10 public school students**

|           | <i>Active-reflective</i> |                   | <i>Sensing-intuitive</i> |                  | <i>Visual-verbal</i> |               | <i>Sequential-global</i> |               |
|-----------|--------------------------|-------------------|--------------------------|------------------|----------------------|---------------|--------------------------|---------------|
|           | <i>Active</i>            | <i>Reflective</i> | <i>Sensing</i>           | <i>Intuitive</i> | <i>Visual</i>        | <i>Verbal</i> | <i>Sequential</i>        | <i>Global</i> |
| Frequency | 220                      | 180               | 165                      | 235              | 141                  | 259           | 174                      | 226           |
| %         | 55                       | 45                | 41                       | 59               | 35                   | 65            | 44                       | 57            |
| $\chi^2$  | 4.000                    | 12.250            | 34.810                   | 6.760            |                      |               |                          |               |
| P         | .046                     | .000              | .000                     | .009             |                      |               |                          |               |

df=1

preferred a 'balance' between the different sub-dimensions, namely between being active-reflective (79%), sensing-intuitive (57%), visual-verbal (45%) or sequential-global (72%), although these percentages were lower than those of the public school students except for the sequential-global dimension. A look at the moderate dimension reveals two important observations, that is, a preference for a sensing rather than an intuitive learning style (27% versus 10%), and a visual rather than a verbal learning style (34% versus 5%). Akin to the public school students, the private school students did not have a 'strong' preference for a specific learning style since all these percentages were between zero and fifteen, with a strong preference for visual learning the highest.

**Table 3: The ILS dimensions and sub-categories of the Grade 10 private school students**

|                   |                     | Frequency | Percent |
|-------------------|---------------------|-----------|---------|
| Active-Reflective | Balanced            | 197       | 79      |
|                   | Moderate active     | 20        | 8       |
|                   | Moderate reflective | 27        | 11      |
|                   | Strong active       | 1         | 0       |
|                   | Strong reflective   | 4         | 2       |
| Sensing-Intuitive | Balanced            | 143       | 57      |
|                   | Moderate intuitive  | 24        | 10      |
|                   | Moderate sensing    | 68        | 27      |
|                   | Strong intuitive    | 3         | 1       |
|                   | Strong sensing      | 11        | 4       |
| Visual-Verbal     | Balanced            | 112       | 45      |
|                   | Moderate verbal     | 12        | 5       |
|                   | Moderate visual     | 84        | 34      |
|                   | Strong verbal       | 3         | 1       |
|                   | Strong visual       | 38        | 15      |
| Sequential-Global | Balanced            | 183       | 72      |
|                   | Moderate global     | 30        | 12      |
|                   | Moderate sequential | 34        | 14      |
|                   | Strong global       | 1         | 0       |
|                   | Strong sequential   | 4         | 2       |

With regard to the hypothesis, Table 4 illustrates to what extent the private school students' preferences were statistically significant.

**Table 4: The significance of the preferences for specific learning styles of the Grade 10 private school students**

|           | Active-reflective |            | Sensing-intuitive |           | Visual-verbal |        | Sequential-global |        |
|-----------|-------------------|------------|-------------------|-----------|---------------|--------|-------------------|--------|
|           | Active            | Reflective | Sensing           | Intuitive | Visual        | Verbal | Sequential        | Global |
| Frequency | 116               | 133        | 175               | 74        | 186           | 63     | 140               | 109    |
| %         | 47                | 53         | 70                | 30        | 75            | 25     | 56                | 44     |
| $\chi^2$  | 1.161             | 40.968     | 60.759            | 3.859     |               |        |                   |        |
| P         | .281              | .000       | .000              | .049      |               |        |                   |        |

df=1

Table 4 shows that grade 10 private school students did not have a significant preference for an active or a reflective learning style, since  $p > 0.05$ . Their preference for a sequential rather than a global learning style was on the five percent-level of significance:  $\chi^2(df=1) = 3.859$ ,  $p < 0.05$ . However, the group had a significantly strong preference for a sensing rather than an intuitive learning style at  $\chi^2(df=1) = 40.968$ ,  $p < 0.01$ , as well as a visual rather than a verbal learning style at  $\chi^2(df=1) = 60.759$ ,  $p < 0.01$ .

Table 5 illustrates the learning style preferences of second year students at university in terms of the ILS scales.

**Table 5: The ILS dimensions and sub-categories of the second year university students**

|                   |                     | Frequency | Percent |
|-------------------|---------------------|-----------|---------|
| Active-Reflective | Balanced            | 189       | 70      |
|                   | Moderate active     | 21        | 8       |
|                   | Moderate reflective | 53        | 20      |
|                   | Strong active       | 2         | 1       |
|                   | Strong reflective   | 6         | 2       |
| Sensing-Intuitive | Balanced            | 164       | 61      |
|                   | Moderate intuitive  | 14        | 5       |
|                   | Moderate sensing    | 68        | 25      |
|                   | Strong intuitive    | 3         | 1       |
|                   | Strong sensing      | 22        | 8       |
| Visual-Verbal     | Balanced            | 140       | 52      |
|                   | Moderate verbal     | 44        | 16      |
|                   | Moderate visual     | 51        | 19      |
|                   | Strong verbal       | 8         | 2       |
|                   | Strong visual       | 28        | 10      |
| Sequential-Global | Balanced            | 188       | 69      |
|                   | Moderate global     | 51        | 19      |
|                   | Moderate sequential | 20        | 7       |
|                   | Strong global       | 11        | 4       |
|                   | Strong sequential   | 1         | 0       |

In accordance with the school students, the majority of the university students preferred the 'balanced' category on the four dimensions of the ILS, as Table 5 shows. Of this group, seventy percent were balanced in their preference for

being active or reflective, sixty-one percent for being sensing or intuitive, fifty-two percent for being visual or verbal, and sixty-nine percent for being sequential or global in their learning style. The second most preferred learning style was for being moderately reflective rather than moderately active (20% versus 8%), moderately sensing rather than moderately intuitive (25% versus 5%), and moderately global rather than moderately sequential (19% versus 7%). Between zero percent and ten percent of the students indicated a strong preference for a visual learning style.

When the hypothesis was tested, some significant preferences were identified as illustrated by Table 6.

Table 6 indicates that the preference of second year university students on the visual-verbal dimension was not significant since  $p > 0.05$ . However, the students significantly preferred the reflective, sensing and global learning styles over the active, intuitive and sequential categories at  $\chi^2(df=1) = 26.661, p < 0.01$ ,  $\chi^2(df=1) = 37.642, p < 0.01$  and  $\chi^2(1) = 16.565, p < 0.01$ , respectively.

## DISCUSSION

Researchers such as Dunn et al. (2009), Schulze et al. (2016) and Yousef (2016) have indicated that students differ in their learning styles and therefore also in the teaching methods that they prefer. In this study the students from the public and the private schools and the university were 'balanced' rather than 'moderate' or 'strong' in their preferences of learning styles when the four dimensions were considered separately, that is, between sixty-five and eighty-two percent of the public school students, between forty-five and seventy-nine percent of the private school students, and between fifty-two and seventy percent of the university students obtained 'balanced' scores (see Tables 1, 3 and

5). In their studies Gappi (2013) and Yousef (2016) indicated similar findings. As noted, a balance between the two extremities is advantageous. It implies that the students could benefit from teaching that implemented and promoted both dimensions. However, when the abovementioned preferences were tested for statistically significant differences, important discoveries came to light.

Regarding the active-reflective dimension, the public school students indicated a significant preference for an active rather than a reflective learning style (see Table 2). These students enjoyed hands-on activities and group work. However, the private school students had no significant preference for either of the two styles and could learn well from active group work as well as by means of individual note-taking and thinking (see Table 4). In contrast, the university students indicated a significant preference for a reflective rather than an active learning style, as mentioned in Table 6, indicating that they learned well through individual writing activities and also by means of reflection.

With reference to the sensing-intuitive style, the public school students were significantly more intuitive in their learning style, while the private school students and the university students preferred the sensing style. In order to enhance learning, the public school teachers therefore need to be innovative with problem solving, while the private school teachers and the university teachers could venture into arenas that include facts and observations. This has important implications for teaching in order to facilitate the understanding of experimental work. The visual-verbal dimension also indicated how the public and the private school students differed, as the public school students were more verbal, and the private school students more visual in their preferences of learning styles. This indicates that the public school

**Table 6: The significance of the preferences for specific learning styles of second year university students**

|           | <i>Active-reflective</i> |                   | <i>Sensing-intuitive</i> |                  | <i>Visual-verbal</i> |               | <i>Sequential-global</i> |               |
|-----------|--------------------------|-------------------|--------------------------|------------------|----------------------|---------------|--------------------------|---------------|
|           | <i>Active</i>            | <i>Reflective</i> | <i>Sensing</i>           | <i>Intuitive</i> | <i>Visual</i>        | <i>Verbal</i> | <i>Sequential</i>        | <i>Global</i> |
| Frequency | 93                       | 178               | 186                      | 85               | 138                  | 133           | 102                      | 169           |
| %         | 34                       | 66                | 69                       | 31               | 51                   | 49            | 38                       | 62            |
| $\chi^2$  | 26.661                   | 37.642            | .092                     | 16.565           |                      |               |                          |               |
| P         | .000                     | .000              | .761                     | .000             |                      |               |                          |               |

df=1

teachers should to a greater extent explain the work verbally, while the public school teachers need to make use of pictures, diagrams and flow-charts, among others (Yousef 2016). Finally, with reference to the sequential-global dimension, the public school students as well as the university students preferred to rather see the 'big picture', than absorb information in small steps.

In summary, although all the students were balanced in their preferences, indicating that they were able to learn from different approaches, the grade 10 public school students, nonetheless, preferred an intuitive, verbal and global learning style, the private school students were significantly more sensing, sequential and visual in their learning styles, and the university students favored reflective, sensing and global learning styles. The preference for 'sensing' learning may be influenced by the fact that the private schools and the universities were more suitably resourced (with equipped laboratories, libraries and visual aids) with better qualified teachers who could use the resources to stimulate the students' (visual) senses for more effective learning, in contrast to under-resourced public schools with poorly qualified teachers who relied on the traditional lecture methods that favored verbal learning.

Apart from independent versus private schools, subject and age also seemed to impact learning style. The fact that the university students, in contrast to the school students (in particular the public school students), preferred reflective to active learning indicates that the students wanted to think things through before trying to solve a problem. This finding confirms that the learning styles of the Ethiopian students, similar to those of other students, changed with age (Schulze et al. 2016). Moreover, in this research with university students in the social sciences, the preferred style was reflective and global. However, research with engineering students at Western universities showed that the students were generally active and sequential (Felder and Brent 2005), which may be related to their particular field of study which often involves subjects that are learned in a sequential manner, such as mathematics. In a study with students in the Business Sciences and Economics, Yousef (2016) found that they were balanced in their preferences of learning styles in the four dimensions.

## CONCLUSION

The aim of the study was to ascertain the learning styles of students at Grade 10 public and private schools and at second year university level in Ethiopia. To this end, 920 students completed the Felder-Silverman ILS questionnaire. Although the study was limited in its reliance on a self-report questionnaire of one particular model, the results are significant with respect to the preferences of the students. The majority of the students were balanced in their preferences when the four dimensions were considered separately, which is encouraging, and indicates that the teachers may confidently use a variety of new methods. The public school students in particular indicated that they enjoyed class activities. The fact that the private school students preferred sensing and visual styles, when all the styles are considered together, does not exclude active learning. In fact, teaching methods that incorporate the visual senses could be used very effectively in active learning such as in experimental work. Likewise, the university students' preference for sensing and global learning could be utilized to stimulate both action and reflection. This would be an expansion of their current preferences for sensing and global learning. Ultimately, more effective learning could deliver better-educated citizens for the benefit of the Ethiopian democracy.

## RECOMMENDATIONS

The above findings have implications for all developing countries. To facilitate efficient learning in classrooms, the teaching methods need to take heed of the students' current preferences of learning styles and use it as a basis to develop critical thinking skills and effective learning at all levels. More research is recommended on learning styles and their relationship with teaching methods, using other models of learning styles. Such comparative studies could enhance the insight into effective teaching and learning at all levels in order to develop citizens who actively participate in developing economies and democracies.

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