









2. The low thermal inertia of the materials; previous studies [6], [7], [8] have demonstrated that the phase-shift time of this type of envelope is only 2 hours, and that in the climatic zone studied it is suggested that an envelope with high thermal inertia with a phase-shift time of 8 hours.

3. The absence of external solar protection; the solar protection in the classrooms are summed up as simple interior curtains that do not provide sufficient protection against the vagaries of the climate.

#### The typology of side corridor plan.

In addition to the deficiencies cited in the two typologies, the side corridor plan presents other deficiencies namely:

- The importance of glass surfaces; the classroom of the side corridor plan has two facades open on the outside. The calculation of the ratio of the area of the openings to the surface of the floor of the classrooms reveals that it exceeds the maximum value required by the bioclimatic recommendations. This has the effect of accentuating unwanted heat exchanges in summer and favoring thermal losses in winter. On the other hand, the central corridor plan typology is characterized by a much lower degree of openness.

- The importance of the shape coefficient; the calculation of the latter indicates that it is important for the two typologies studied. However, the typology of plan with central corridor is lower.

#### 4.3.2. Comparison between the two typologies

On the basis of the results presented above, we note that the two typologies share several common characteristics and failures compared to the bioclimatic study. Nevertheless, the design of the central corridor plan typology is less deficient. Although it does not offer the conditions of comfort, it is better adapted to the climate context of the city of Tizi-Ouzou thanks to its more compact and less open design.

## 5. CONCLUSION

At the end of this study, we conclude that the problem of thermal comfort in school buildings in Algeria is the result of an unconcerned conception of the climate. The results of the investigation demonstrate the low thermal performance of the shape and composition of the envelope of the two typologies studied during the two periods with the exception of the first two hours of the morning in summer and the last two hours of the Afternoon in winter. This is supported by small temperature differences between indoor and outdoor.

Moreover, the study of the architectural and constructive characteristics of each of these typologies compared to the bioclimatic analysis of the city of Tizi-Ouzou reveal that thermal comfort and environmental quality are not taken into account in these buildings. Numerous failures, notably of the typology the side corridor plan, are listed, they can be summarized as follows.

- The composition of the envelope which does not play its protective role because of its low thermal inertia;
- The spreading shape, in particular of the typology of the side corridor plan, which generates a large thermal loss surface;
- The inadequacy of the percentage of glazed areas in relation to the bioclimatic strategies recommended for this area and the nature of the glazing (simple glazing), which increases heat exchange between the interior and the exterior;
- Inadequate orientation of most classrooms;
- The absence of external solar protection and thermal insulation.

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## NOMENCLATURE

The temperature of the ambient air: it is the temperature of the fluid (air) which circulates around the individuals; its measuring unit is the degree Celsius (°C).

Relative humidity: it is the relationship between the quantity of the water contained in the air in the form of vapor, with the room temperature, and the maximum quantity which it can contain; it is expressed as a percentage (%).