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# Folding Kindergarten Chair

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**Abstract:**

*The Trending Styles of the todays era are demanding some innovative, space saving and sleek designs for making the spaces more optimized as well as functional. The trends to approach this style is done by incorporation of foldable and stackable furnitures in the spaces this also fits in more activities making space more usable and multi-functionary. There are various approaches, concepts and styles to make the spaces more functional. For the same, a foldable chair, for kindergarten is designed making the space more adaptable to increase the user strength as well as incorporation multiple activitives hence through the idea of folding furniture, since the reasons are growing population and increased number of admissions in the kindergartens. So, such concepts can play a very important role in space utilization and organization. Thus this ideation leads to the folding furniture where the cavity resting space of base on one of the leg makes it a new style of fold and fit without any additional accessory demand. The design will make the spaces caring number of quantities still being spacious and multipurpose*.

## Introduction:

Folding furniture performs various functions as well as activities. These days dut to increase in the cost of the living, there is a greater need for a space saving furitures. A minimalistic approach is being adopted across the globe by the designers for such situations. Also such an idea makes us stay comfortabe even when guests visit or friends drop by. Furnitures from folding beds to folding chairs and tables, has the unique ability to transform rooms into convertible ones within our homes. When these types of furnitures are not in use, can be stored in the dead spaces like corners as well as in the spaces like attic, basements or the corridors etc. To achieve this a number of designers are working for it trying various approaches and styles to make the spaces more functional. General trends in folding furniture are making them more usable and proffered as user mind sets are being more functional approach rather than aesthetic appeals. The vibes of mechanical and technical design had become a grasping factor for foldable and stackable furniture [1]. Tangible results of such concepts can be understood for this piece of furniture. This chair is composed of three parts with three hinges and, when folded, it's perfectly flat. Hence this means that we can have a comfortable number of these chairs without needing a lot of space to store them [1].

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Figure 1: Planer folding chair.

Folding furniture can give experiences with huge surprises, until they transform into actuality. Like in this example of a chair from Ikea product category 'Terje', is a good example of foldable furniture, which when not in use can be hanged on the wall. The hole at the backrest allows doing so. This chair has been designed for home use for the breakfast nook or when we need extra chairs for dinner guests or parties. Thus, meets the requirements of durability and safety, set forth as per the standards of human ergonomics [2]. With such a kind of folding chairs we can always have extra chairs on hand for all of our friends. When the party's over, by just folding them up again and put them behind the door or under the bed. If there is not much floor space hence than, we can also hang folding chairs on the wall with a hook [2].

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Figure 2: Lightweight foldable chair stacked as well as hanged on wall.

By understanding these concepts of folding furniture. A chair was designed for the kids of kindergarden, which is to satisfy the demands of multifunctional utilization of space form the reading and writing with the help of table and chair to the on floor dancing and playing activities. Hence the design of folding chair is conceptualised where the chair folds flatter mechanically. Chair incorporates three legged structure, centre pivoted style for folding it to a flat unit. The design simply fits the ergonomically and anthropometric demands of the furniture required for the target age .The cavity resting space of base on one of the leg makes it a new style of fold and fit without any additional accessory demand.The sleeker geometric design makes the chair comfortable and light weighted.The design could be made in various materials ranging from various types of wood and metals along with fusing trending composite materials.

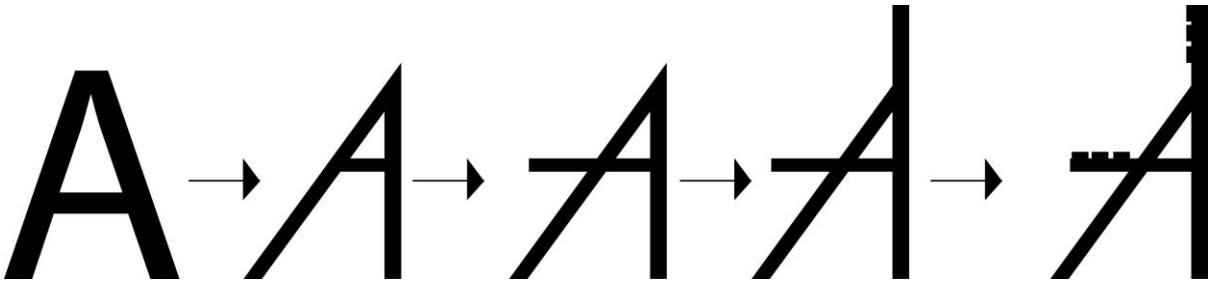

Figure 3: Concept formation

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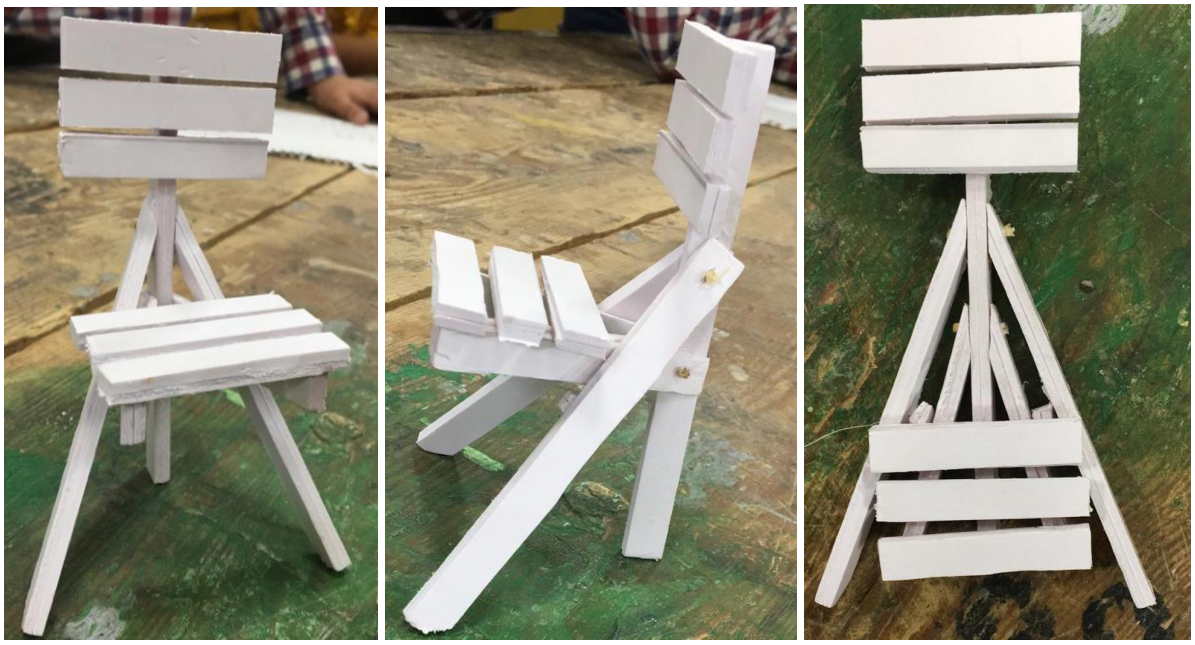

Figure 4: Process model to understand the mechanism.

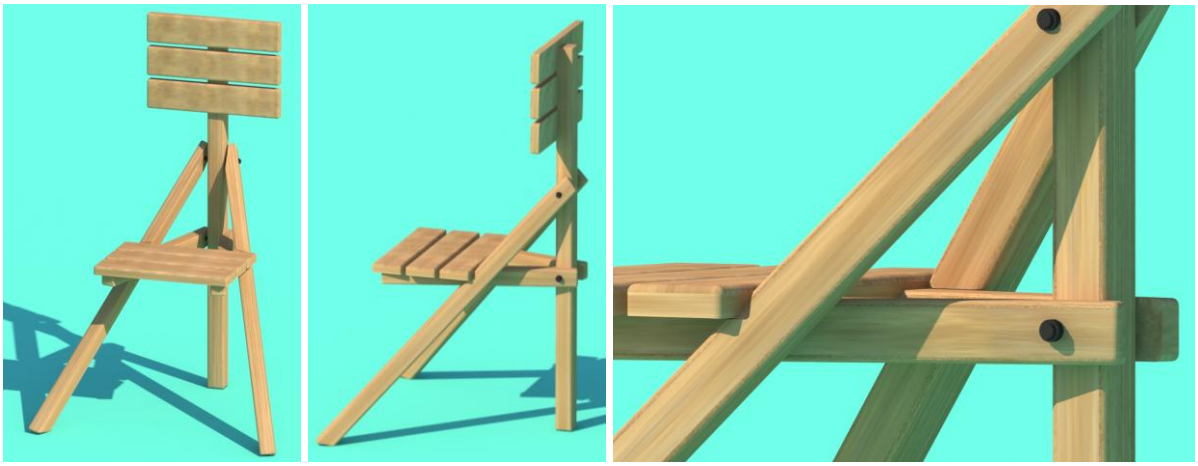

Figure 5: 3d rendered view with material texture

**Methods and material:**

**Methods:**
The overall design comprises of three units starting from main structure of the backrest which comprises of one leg. The rest two units are the two legs at the right angle to the first leg and sitting surface which is again supported on to thw first as well as second unit with the help of nut and bolt joinery.

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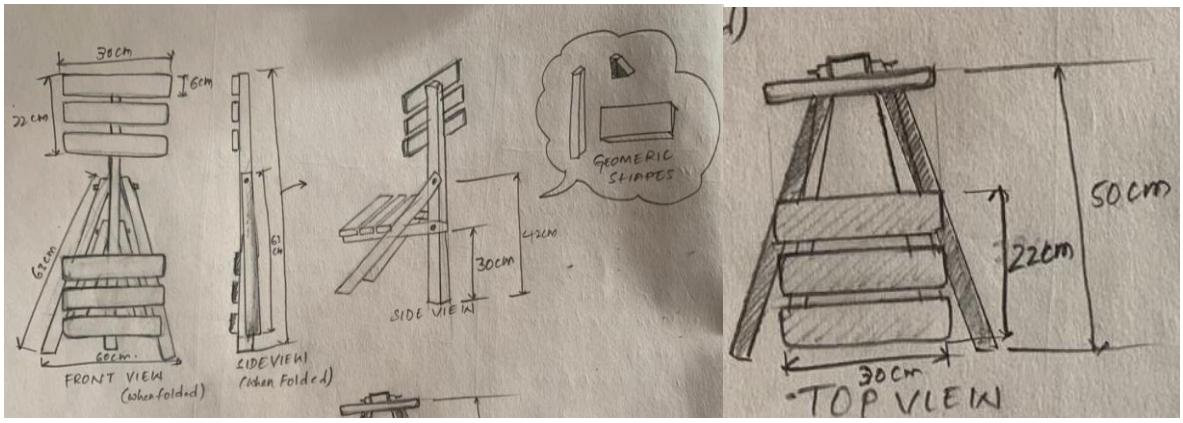


Figure 6: Ideation: Process with sketches

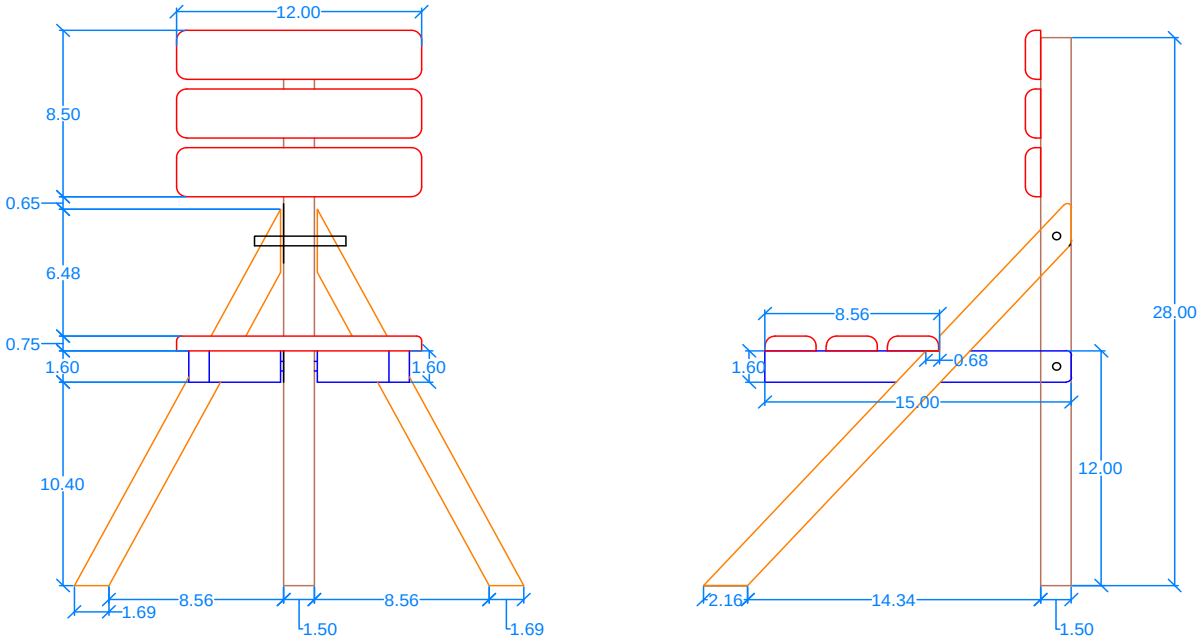


Figure 7: Front elevation and side elevation in open condition of chair

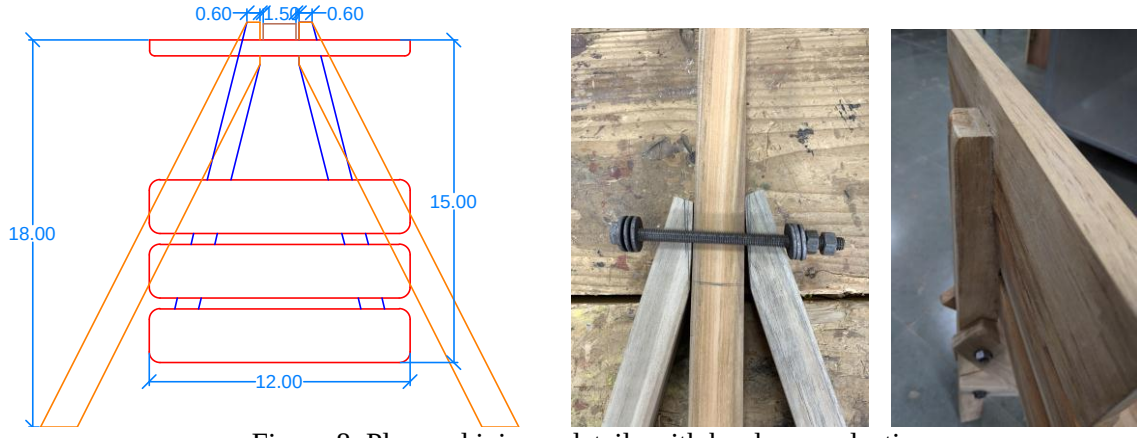


Figure 8: Plan and joinery details with hardware selection

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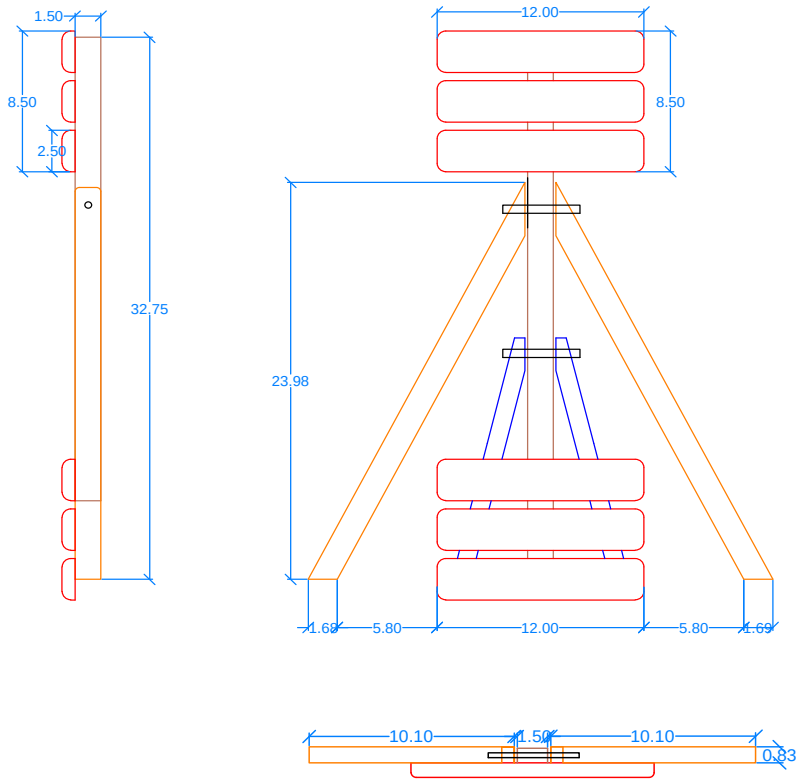


Figure 9: Side elevation, front elevation and plan, when chair is in closed condition

The fold mechanism is based on centre pivoted base (nut and bolt) which is attached to base batten 1½" x 1½" with dowel joinery. The overall base and back of the chair incorporates 3 piece wooden battens 12" x 2 ½"of thickness ¾ ". Dado joint to connect the seat with legs, also for the backrest. Nut and bolt is used to join units. Again dowel joint is used to strengthen the chair. The sizes and dimensions of the chair is taken after studying the standard ergonomics chart of the children from approximately between 4 years of age till 7 years.

| AGE | SEAT HEIGHTS | | | | | | TABLE HEIGHTS | |
|---|---|---|---|---|---|---|---|---|
| | 8" | 10" | 12" | 14" | 16" | 18" | | |
| Age 2 | • | • | | | | | Toddler | 15"-20" |
| Age 3 | | • | • | | | | Toddler | 16"-21" |
| Age 4 | | | • | • | | | Toddler | 18"-23" |
| Kindergarten | | | • | • | | | Standard | 19"-23" |
| Grades 1 & 2 | | | • | • | | | Standard | 19"-25" |
| Grades 3 & up | | | | • | • | • | Standard | 21"-25" |
| *As a rule, there should be 6" to 10" between the chair seat and underside of table. | | | | | | | | |

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Figure 10: Ergonomic table for children studying in kindergarten

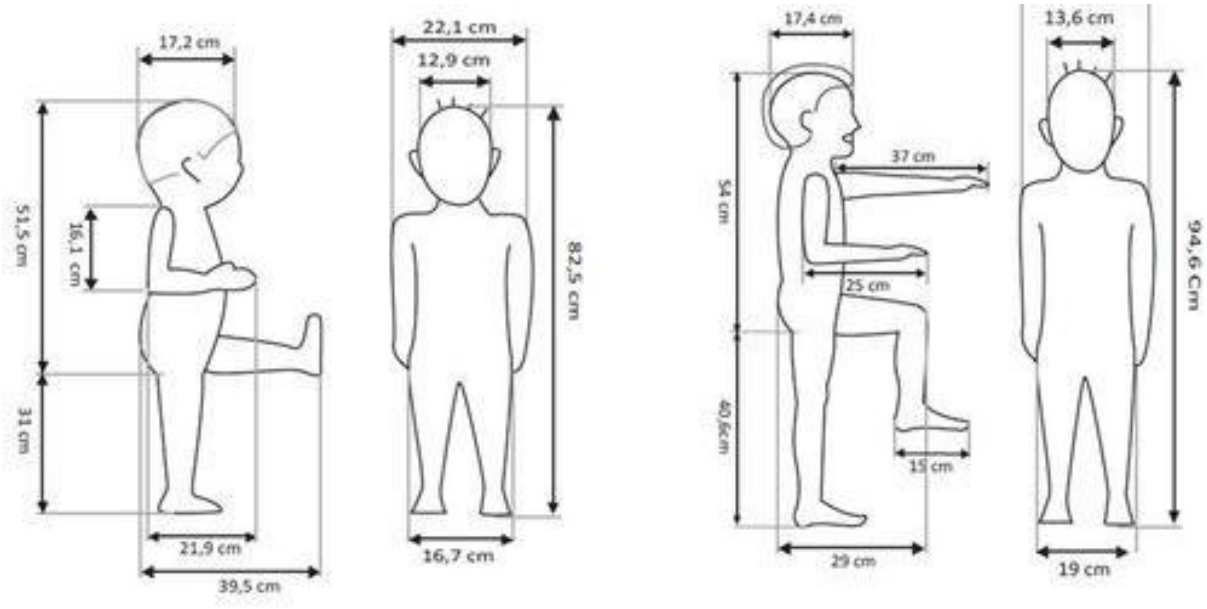


Figure 11: Anthropometric diagram of kids in kindergarten

Folding chairs are the best functional example for furniture which we use daily. We may use the chairs as per the availability of the space. When you are not using it, one can fold it flat and store it. Portability and longevity are other reasons why it is a good choice amongst consumers.

Figure 12: Final 1:1 scale prototype made up of teak wood.

**Discussion:**
The points discussed during the design process were:

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1. How the chair will stack when placed together with each other.
• Challenge was to fold in such a method so that all the elements come in one plane.

2. What should be the approximate standard weight of folded chairs?
• Weight should be such that kindergarten kids should easily carry it, less than 5 Kgs.

3. In how many materials this furniture can be made
• Wood, bamboo, aluminium and mild steel.

**Conclusion:**

• Cross section of all the members can be thinner.

• Identify a system which should stack all the folded chairs together in a sophisticated manner

• The folding mechanism can be of different material to give strength to structure and seating surface well as back rest surface can be upholstered.

**References:**

[1]. https://www.homedit.com/folding-chair-monstrans/
[2]. https://www.ikea.com/in/en/p/terje-folding-chair-red-20225678/
[3]. http://www.kickvick.com/space-saving-creative-furniture/