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A PEDAGOGICAL CONTEXT TO INTEGRATE TREND FORECASTING TECHNIQUES INTO INNOVATIVE DESIGN EDUCATION

سياق بيداجوجي (تعليمي تربوي) لدمج تقنيات التنبؤ بالاتجاه في تعليم التصميم الابتكاري

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ABSTRACT

Despite the abundance of knowledge in trend forecasting evident within many disciplines, there is a dearth of information on the application of trend forecasting in design education in the context of determining the innovation in trends' concepts and philosophy, theme, colour, materials and finish. This issue stems from the inadequacy of the traditional learning framework in design curriculums to keep up with the multi-layered structure of design professions' demands that acquire expanded, cross-boundary knowledge and futurology skills. This study suggests a thematic approach that employs trend forecasting as an integral part of the design process, entwined with form, function, desirability, and other considerations that highlight the market development within the real life context. This paper aims to investigate the significance of trend forecasting incorporated in the design education development process, and to set a practical guidance to educators to create a culture of anticipatory progress in learning, teaching and assessment that is completely aligned with the strategic objectives. The study has adopted a case-study based methodology of presenting examples of senior students' projects and assessing the learning outcomes to be applied as medium synthesizing for new ideas generation. The results demonstrate forecasting through different scales of studies to provide a learning experience that is based on research, application and interaction with the design industry.

KEYWORDS

Pedagogical Context; Trends Forecasting Techniques; Learning outcomes; Innovative Design.

الملخص

بالرغم من وفرة المعرفة المعلوماتية حول التنبؤ بالإتجاهات في العديد من التخصصات، إلا أن هناك ندرة في المعلومات حول تطبيق التنبؤ بالإتجاهات في تعليم التصميم في المجمل، ويتضح هذا في سياق تحديد الإبتكار في التصميم والإلمام بمفهوم وفلسفة الإتجاه التصميمي، وكل من الألوان، الخامات، والشكل النهائي. تنبع هذه المشكلة من عدم ملاءمة إطار التعلم التقليدي في مناهج التصميم لمواكبة الإطار متعدد المستويات لمطالب مهن التصميم التي تتطلب معرفة موسعة بمهارات التنبؤ المستقبلي. تقترح هذه الدراسة نهجًا موضوعيًا يستخدم التنبؤ بالإتجاهات كجزء من عملية التصميم، متحدا مع الشكل والوظيفة ورغبات المستهلك وغيرها من الإعتبارات التي تسلط الضوء على تطور السوق في سياق الحياة الواقعية. تهدف هذه الورقة إلى دراسة أهمية التنبؤ بالإتجاهات في عملية تطوير تعليم التصميم، ووضع قائمة ارشادات عملية للمعلمين لتأسيس ثقافة التحسين في التعلم والتدريس والتقييم بشكل استباقي ومتوافق تمامًا مع الأهداف الإستراتيجية للعملية التعليمية. اعتمدت الدراسة منهجية قائمة على دراسة حالة لأمثلة من مشاريع طلبة السنة النهائية، وتقييم مخرجات التعلم كمدخل لتوليد الأفكار الجديدة. تخلص النتائج إلي إبراز أهمية تقنيات التنبؤ من خلال عدة مقاييس مختلفة من الدراسات لتوفير تجربة تعليمية مستنيرة من خلال البحث والممارسة.

الكلمات المفتاحية

السياق التربوي، تقنيات التنبؤ بالاتجاهات، مخرجات التعلم، التصميم الإبتكاري.

1. INTRODUCTION

Individuals have attempted to anticipate what will happen in the future throughout history. Various terminologies related to the idea of 'seeing into the future', these include futurology, trend forecasting, foresight, and forecasts, but they all deal with mapping out what is yet to come in some way. The developing affirmation of the significance of trend information in design and the more extensive business network is obvious about progression. The concept of what the future holds is constantly present in the design process. Nowadays, the database and the new circumstances created by communication and information technologies within interior design activities signal a change in paradigm and perspective. It is doubtless that as a result of developments in technology and changes in design processes, the need has shown up for better approaches both in practice and education that go beyond the interdisciplinary methodology (Sheil, B., 2008). In design education, as designers move throughout the design process, their distinctive thought processes provide them with the capacity to generate innovative design solutions while addressing clients' needs. This perspective, characterized by design thinking, provides solution-focused, critical thinking techniques while affording innovative mind-sets to investigate and analyse design solutions (Adams, R. S., Daly, S., Mann, L. L., & Dall' Alba, G., 2011). All variations and enhancements are essential to keep pace with quick changes. The creative process of design is aided by trend forecasts, establishing the foundation for potential ideas in a condition of 'credibility'. Trend forecasting may have aided the designer's understanding of such a proposition. Understanding where personal beliefs, convictions, and lifestyle for target users, as well as technology, are headed is an important part of the creative process, as it aids in the detection of possible consumer gaps that could be solved with the concept or product. (Streits, N., Kameas, A., & Mavrommati, I., 2007).

1.1 Definition of Terms

Trend is defined as a change or development towards something. It is a change of action or mindset that affects a large number of people. This change is often guided by the designers' clear concept and vision, which is focused on projections, colour, and material research, that has a long-term influence on the market and people (Vejlgaard, H., 2012). Forecasting is referred to the process of predicting what will happen in the future based on gathering and analysing past and current data. It is not an exact science, but rather a set of statistical tools and techniques backed up by human judgement. Forecasting may be a combination of scientific calculation or statistics or wizardry and instinct. It is a process that could be used in many disciplines such as; fashion, interior design, graphic design, languages, Marketing and sales response to advertising procedures, finance and risk management, economics, and demography (Hyndman, R.J., & Athanasopoulos, G. 2018).
Forecasting is defined in the following way: 'Estimating in "unknown" situations'. Forecasting, however, connotes an estimation of the future. In forecasting, the area to be observed or the research questions have to be known in advance (Armstrong, J. S. 1985).

1.2 Problem Statement

The research problem arises from the fact that despite the abundance of knowledge in trend forecasting evident within many disciplines, there is a dearth of information on the application of trend forecasting in design education. The questions to be raised, investigated and answered are:

- *What is the significance of integrating trend forecasting techniques in design education?*
- How can the methods of forecasting used in design education reflect on generating innovative *ideas?*
- *What would be the impact of adopting such a pedagogy of integrating forecasting techniques in design education on students' learning experience?*

The projects outcomes adopted different approaches, based on the trend researches and analysis, which inspired their process of form generation, use of materials and the creation of their projects' visual identity that were applied in a trend book, trend poster and a set design.

1.3 Aims and Objectives

This paper focuses on the hypothesis that a pedagogy of adapting the strategy of Integrating trend forecasting techniques in interior design could have an impact on the outcome of innovative design courses expressed in the course of (Forecasting Interior Design Trends) that is designed to be taught to the Interior Design students at October University for Modern Sciences and Arts (MSA) in the level of graduation. The aim of this study is to diagnose the consequences of using forecasting tools & techniques in design education. The objectives are to highlight current forecasting methods that could be developed into more formal design forecasting approaches. It identifies areas of best practice and assesses their relevance to design practice and education. In order to address this challenge; along with the background literature-based research, A case-study based methodology was used in order to develop the framework for the tools' selection.

2. BACKGROUND

Understanding innovation in student design projects is highly related to the commercial performance of businesses (Childs & Fountain, 2011). As a result, significant research efforts have been focused on recognising and assessing innovation (Amabile, 1996; Casakin, 2007; Sternberg & Lubart, 1999). Assessment of innovation and creativity is essential for selecting new products, evaluating the level of innovation in businesses, and identifying better inventors and designers (Sarkar & Chakrabarti, 2008). Since novelty is a key feature of a creative concept, it is regarded as one of the core components of creativity (Sarkar & Chakrabarti, 2008).
In grounded theory research, the collaborative essence of interviewing is a common practice (Strauss & Corbin, 2008). The researcher tries to analyse data in order to develop a theoretical understanding of what is acquired through observation (Kvale & Brinkmann, 2008). Some of the coding methods used in grounded theory research are open coding, axial coding, and selective coding (Strauss & Corbin, 2008), which enable the researcher to make constant comparisons and ask questions about what is and is not understood. The inductive and deductive reasoning processes of comparing subcategories to a category are used in axial coding to make relations between categories possible (Strauss & Corbin, 2008).

Educational planning involves obtaining and analysing data and discussing them to make projection for future educational development particularly estimates of human, physical and financial resources needed to achieve objectives (Fadipe & Adepoju, 2006). Educational planning, according to the National Policy on Education's Implementation Committee, is described as "a continuous process of collecting and reviewing facts and providing information to decision makers on how well the education system is accomplishing its goals in particular, on how the cost effectiveness of educational programs and specific objects can be improved". (Blue print, 1978).

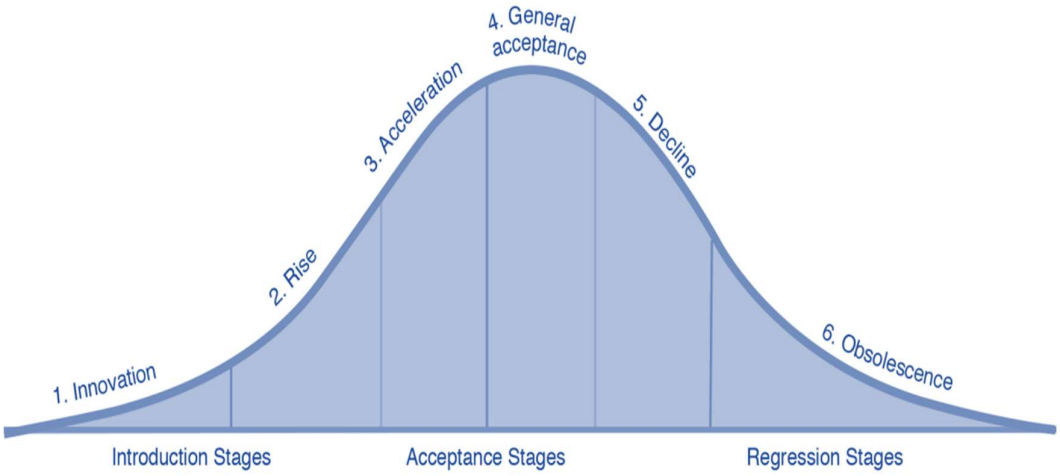
Today and tomorrow, Individuals who can use analytical and strategic thinking skills to solve challenges as a team are in high demand. The way information is acquired, built, and transmitted has completely changed as a result of technological advancements. When it comes to education, it's debatable whether it's capable of producing critical and innovative thinkers who can meet the needs of today's and tomorrow's social and economic worlds (Fndkolu & lhan 2016).

2.1 Trend forecasting-based learning Approach

Trend forecasting-based learning has recently gained a lot of attention as a pedagogical method for improving the learning experience by increasing commitment and encouragement. The use of forecasting techniques, components, and attributes in a meaningful manner within educational settings to facilitate learning and motivation can be described as trend forecasting approaches (Kapp, K. M., 2012). The pragmatic design approach aims to be used in a way that incorporates a scientific context and a hypothetical process with a conceptual design framework and a building phase. A literature review and research reviews are used to establish the design process. The scientific and social aspects of the project are explored in this phase. Furthermore, the concept and production stages are incorporated into the design process. The integration of trend forecasting techniques plays a crucial role in design education. Integral forecasting context strives to think and learn in a multidisciplinary manner, and to incorporate all of these elements in a multidimensional manner, so that potential designers may raise awareness of these issues and strengthen design solutions (Demirbilek, N., & Demirbilek, O., 2007).

2.2 Trend Anatomy

Trends can be emerging, building or declining. The pioneering trend sociologist "Henrik Vejlgaard" reveals this surprising truth regarding the mechanism of trend saying; "There are actually predictable patterns behind every trend". Vejlgaard presents a compelling body of evidence demonstrating that everyone can identify an emerging trend, analyse it, and make forecasts in order to deal with ever-changing technology. The market and consumers are increasingly transitioning from conventional to more modern lifestyles (Vejlgaard, H., 2012) *(Fig. 1).*



(Fig. 1) - Trend life cycle change indicator. Source: https://www.semanticscholar.org/paper/Consumer-Behavior-Characteristics-in-Fast-Fashion-Yinyin/1deefe1dac0c07263a7072e35a1dd34619075f12/figure/0 (accessed 18/7/2020)

People may not be following the same trends but they all following some specific trends and the reason behind this is the intention of belongingness to be a part of a particular group. People need reassurance for their choices.

There are some factors that influence the character and direction of trends such as; dominating events, surrounding social groups and community, attitude, technology, and style interactions between fashion, architecture, interiors, auto-industry, digital games and market changes (De Gooijer, J. G. & Hyndman, R. J. 2006).

2.2.1 Trends Types

Trends are often characterized and classified into various types *(Vejlgaard, H., 2012) (Table 1).*

Table 1: Trend types. Source : (Vejlgaard, H., 2012)

Trends Types	Trends Characteristics
Mega Trends	Megatrends are characterized by being a global pattern related to behaviour, mobility, and the environment. These are seismic trends that last ten, twenty, or thirty years. It produces a framework or used to introduce a theme and direction such as; Demographic Change, Urbanization, Digitalization, and Resource stress.
Macro Trends	These are offshoots of mega trends and the result of the adaptation to the megatrends. On a global scale, it is a consistent change in the direction of certain phenomena. Macro trends stay for several years such as; Automation, Artificial Intelligence, Parametric, and Nanotechnology.
Micro Trends	A micro trend is a short-term trend in the direction of a phenomenon that is fairly widespread within a given sphere of influence but stays for fewer years than Macro trends such as; New Memphis, and Brutalism.
Super Trends	These are trends that are ongoing. They generally stay for a few years before boredom sets in and they morph into something else. It mainly based on trends of products concerning colour, materials and finish such as; marble side tables and floral patterns.
Flash Trends	These trends do not last long but they will be noticed appearing in response to celebrity endorsements, fashion show, seasonal weather, political events and popular dialogue, such as; certain colours or prints or furniture pieces.

2.2.2 Trend Forecasting

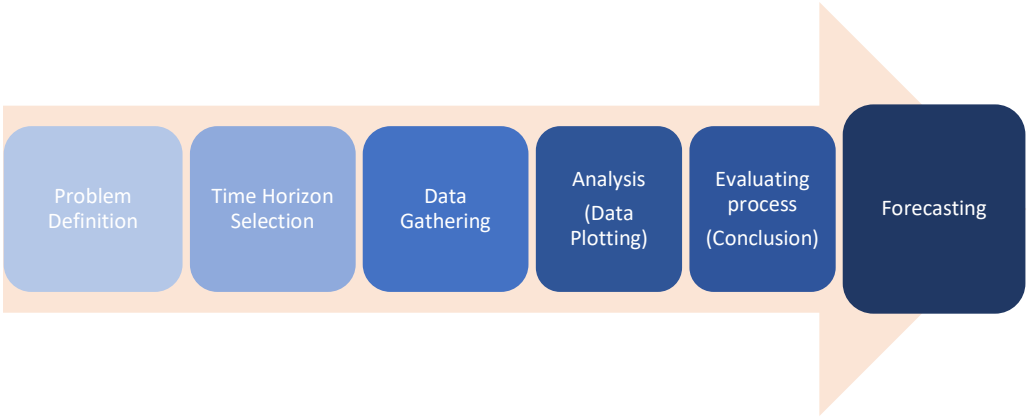
Trend forecasting is the art of predicting the consumer's mood and buying behaviour at a certain time of the year. It is also influenced by the fashion cycle, and it plays a significant role in the initial stages of recurring fashion. As trend forecasting results are mainly influenced by the forecasting methods used by the end-user. It is critical to identify the approach that is most suitable for the business model that has been used in the past (Cuhls K, Blind K, Grupp H. 2002).

2.3 Forecasting Methods and Techniques

There are several methods for looking into the future. These are used in a variety of disciplines that seem to be unrelated. Many organizations have identified the importance of information and thus utilize numerous methods and techniques to provide it.

These methods look at historical data for patterns and periods, then extrapolate to the future using statistical techniques. All of these methods presume that the forces that shaped the past will continue to do so in the future. When forecasting short-term horizons, this is a reasonable assumption, but when forecasting medium and long-term horizons, it falls short. The stability of the environment is the key factor in determining whether trend extrapolation is an appropriate forecasting model (Walonick, D. S., 1993).

The method chosen is determined by the available data and the predictability of the quantity to be forecasted. Certain previous steps in the forecasting process must be taken in order to obtain reliable results (Armstrong, J. & Green, K., 2017) *(Fig. 2).*



(Fig. 2) - Steps of Forecasting Process/ Methodology. Copyright: The author.

Step 1: Problem definition

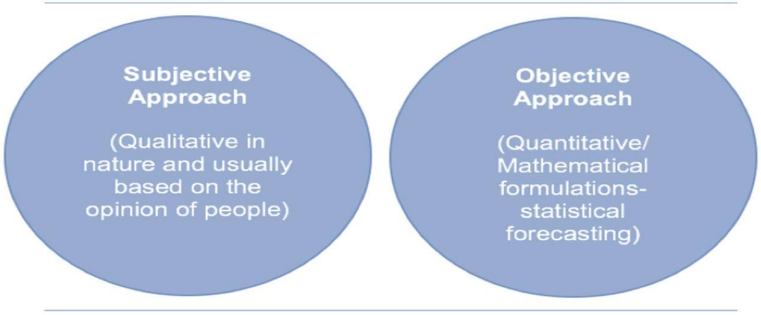
A thorough definition of the problem necessitates an understanding of how the forecasts will be used. A forecaster should spend time speaking with those who will be involved in the data collection, database maintenance, and future planning activities.

Step 2: Time Horizon Selection

Personnel, output, and transportation scheduling require short-term forecasts (1 day-1 year). Although medium-term forecasts (one to five years) are needed to identify trends, potential resource needs, purchase raw materials, recruit staff, or purchase machinery and equipment. In strategic planning, long-term forecasts (more than 5 years) are used. Business opportunities, environmental conditions, and internal resources all require such decisions.

Step 3: Data Gathering

There are two approaches for forecasting methods that have different applications of usage and those are; Subjective Approach (Qualitative) and Objective Approach (Quantitative) *(Fig. 3)*.



(Fig. 3) - Forecasting Methods (Subjective Approach (Qualitative)/ Objective Approach (Quantitative). Copyright: The author.

- **Subjective Approach (Qualitative)**

It is usually used when no data is available or when the data that is available isn't applicable to the forecasts. It consists of a set of selected methods:

- **Delphi method:** The Delphi technique is a “Consensus” research method. The Delphi method is focused on the idea that group decisions are more reliable than individual decisions. Most of the time, the aim is to get the expert panel to agree on potential "best" solutions.
- **Analogy Method:** A useful approach that is often implemented in practice is forecasting by analogy.
- **Scenario-Based Method:** The aim of this method is to create forecasts based on scenarios. These stories or narratives use a combination of elements to convey potential situations, including visual and factual data. Trends should be visually portrayed in the creative process.
- **Judgmental Method (New Product Method):** Due to the lack of historical data, judgmental forecasting is typically the only choice for new product forecasting. So it is based mainly on customer intentions, executive opinion, and sales force (Hyndman, R.J., & Athanasopoulos, G. 2018).

- **Objective Approach (Quantitative)**

It is used when numerical data from the past is available because it is reasonable to believe that certain elements of past trends would persist. This approach relies on selecting a forecasting model based on available resources and data.

- **Time Plot/ Time Series Model:** Simple forecasting techniques, such as using the most recent observation as a forecast, can be as simple as using the most recent observation as a forecast, or as complicated as using the most recent observation as a forecast. There might be occasions when no data is available at all. A time series is something that is observed sequentially over time (Annually, quarterly, monthly or weekly, etc.,). The aim of time series data forecasting is to predict how the sequence of observations will continue.
- **Casual Method / Explanatory Model (Variables):** Based on all effective variables that might control the trend life cycle and it also refers to sudden or unexpected variables.

Step 4: Analysis (Data Plotting/ Graphing)

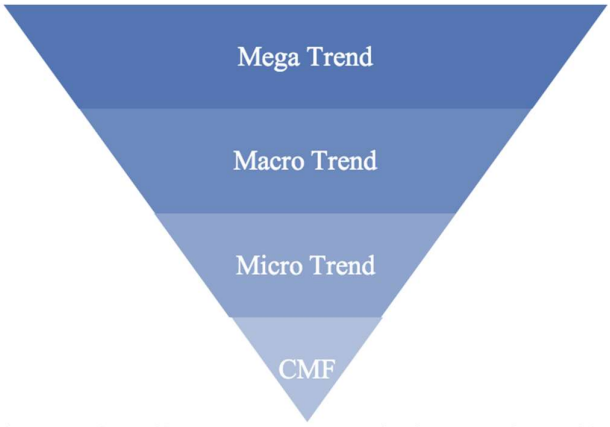
It is determined by graphing historical data and comparing two or three potential models, as well as the strength of relationships between forecast variables. It emphasises the importance of the relationships between the variables available for study, as well as proof of market cycles.

Step 5: Evaluating Process (Conclusion/ Consensus)

Once a Forecast has been chosen and its parameters have been calculated. Only after the data for the forecast period is available can the performance be properly assessed. Since observations close in time are often close in size, autocorrelations for small lags appear to be strong and optimistic when data has a pattern. White noise is a term used to describe time series that have no autocorrelation (Hyndman, R.J., & Athanasopoulos, G. 2018).

2.3.2 Trend Forecasting Significance

Forecasting plays such a psychological role bringing all aspects of modern design together. It determines with accuracy all what user may need or desire in the future and It provides a change pattern in interior industry that leads to economic flow. The change in concepts, design ideas, colors, materials and finish (CMF) is no doubt a reflection to the mega trend as a forcing power that automatically affect the macro and micro trend as stated above (Docebo, A. R., 2014) *(Fig. 4).*



(Fig. 4) - The hierarchy of trends types that affect mega, macro and micro trends reaching the CMF of products as a reflection. Copyright: The author.

2.4 Trend Forecasting Integration in Design Education

The current debate about architecture and interior design has revealed that new geometrical principles and theories, trends, continue to entice architects and interior designers to create complex, dynamic, and novel forms and structure) Malhotra, S., Das, L.K. & Chariar, V.M. 2014). Learning and teaching trend forecasting approaches in design education aim to strike a balance between the imaginative process and a critical understanding of more realistic requirements in the creation of a proposition. Each design outcome is typically one-of-a-kind, non-repetitive, and self-contained in its creation and production. The curriculum's rationale must allow students to construct a model that will direct them in understanding and applying design expertise, skills, processes, and theories, as well as provide a balanced synthesis between the creative, technical, and humane aspects of the profession (Demirkan, H., & Demirbaş, O., 2010).

Integrating trend forecasting techniques into design education requires a whole vision provided with contextual data on commercial Information – understanding the industry, its sectors, trade shows, exhibitions, market reports, etc. (Wang, T. 2010). Potential business developments are highlighted by observing likely economic patterns in countries (Academy of Design 2013).
Designers may use this data to define fabrics, colours, and textures, among other things. Trends are expected for specific time intervals – one year, two years, and so on. Potential patterns are often summarised using associational terms. Visual information can be found in the design press, at product launches, trade shows, in books and magazines, and in the work of a variety of design firms (Zou, H., & Yang, Y. 2004).

3. METHODOLOGY

The method of research is an exploratory case study in the form of an attempt to integrate forecasting techniques in innovative design education that is related to the advanced course (Forecasting Interior Design Trend) which is delivered in the level of graduation. This was to assess the outcome of the course of (Forecasting Interior Design Trend). The methodology of anticipation follows a systematic enquiry using the author observant techniques during the research and design phases of students projects followed by a comprehensive analysis of each project and student's performance.
The students' cultural identity and the contextual factors are also investigated and analysed. The study made up on 11 groups of students, each group consisted of (5 to 7) students including a team leader

with a total number of (70 Students) from the 2018/2019 interior graduation students of Interior design department at October University for Modern Sciences and Arts) MSA University) .

3.1 Research Constraints

The method of research as originally conceived to assess the outcome while some barriers were experienced which might have prevented certain actions or procedures from being used. This includes:

a) Lack of awareness of forecasting process, techniques & implementation among teaching assistants.
b) Very tight time schedule (only two credit hours).
c) Differences in students critical thinking skills.
d) Students previous bad experiences with group work.
e) Huge number of students enrolled compared to provided hours for following up.
f) Learning space constraints of working in a classroom due to the unavailability of a design studio.
g) University regulatory considerations of student's assessment.

4. CASE STUDY BACKGROUND & ANALYSIS

A case study was used in this research to provide an up-close, in depth and detailed examination to the course of (Forecasting Interior Design Trend). The course was designed to be delivered to interior design students at the faculty of Arts & Design/ October University for Modern Sciences and Arts) MSA University) . The course is a core course with two credit hours (1 Credit Theoretical/ 1 Credit Practical) . It is considered as one of the required courses for graduation. The course was delivered to students in their fourth year/ the year of graduation (Spring Semester) for the academic year 2018/2019. The study made up on 11 groups of students, each group consisted of (5 to 7) students including a team leader with a total number of (70 Students).

4.1 Course Information

The course was intended to encompass new trends in interior design, trends types, different factors that affect trends and tools of forecasting within the scope of interior design. It was structured to develop, advance the working methodology of interior design students and prepare them for profession business. It helps students to establish key places to look to spot emerging interior design trends and become aware of the key influencers shaping exciting new interior design trends. This course examines the human, cultural, and technological factors that have influenced recent design developments. It focuses on the effect of integrated trends in the visual arts on design. This course was intended to cover emerging design patterns, trend types, and trend driving forces.

4.1.1 Intended learning outcomes (ILOs)

On Completion of this course students were able to demonstrate mentioned skills *(Table 2).*

Table 2: Detailed ILOs of Forecasting Design Trends Course. Copyright: Copyright: Course Information Format-designed by the author/ Course Instructor.

Learning Outcomes ILOs		
A. Knowledge and Understanding	A.1. Identify Trends types and methods of forecasting.	A.2. List trends affected applications.
B. Cognitive Skills	B.1. Analyse and articulate effective recommendations for strategic competitiveness in new trends.	B.2. Explore how various driving forces are creating and shaping trends.
C. Practical Skills	C.1. Exploit knowledge of the characteristics of market and clients' dynamics and competitive analysis.	C.2. Apply methods to incorporate trends into different designs.
D. Generic Skills	D.1. Implement effective tools of presentation skills.	D.2. Interact efficiently with others to research and compile information through using both convergent and divergent thinking.

4.1.2 Delivery/ Teaching Strategies

Delivery/ Teaching Strategies have been stated through; Lectures, watching videos and online activities, directed reading and researches, guided exploration, Individual tasks/group projects, Tutorials and discussions, cooperative learning, brain storming and group discussions, focused exploration, along with class presentations that were developed to evaluate the student progression.

4.1.3 Course Aims

Table 3 - Areas of student's development through Trend Forecasting course. Copyright: Course Information Format-designed by the author/ Course Instructor.

Student Development **This Course focused on the development of students abilities in the following areas:**	
Enquiry	- **Students will be devising and conducting a personal strategy for the planning of work that is relevant both to creative design discipline generally and to their practice specifically.** - **Students will be encouraged to research and analysis that is relevant to the evolving assignments and which will establish an underpinning context.**
Contextual understanding	- **Contextual learning will be involved in students' self-reflection, analysis and research in relation to creative design in particular and to personal development as students of art and design in general.** - **The emphasis will be on using intellectual and practical processes that will be developed by the specific visual communication medium that is used in order to resolve the problems and develop an outcome.**
Collaboration	- **Presentations, open discussion and critiques will help to draw strengths and weaknesses of students' knowledge. The course includes working across disciplines will provide opportunities to explore collaborative work.** - **The use of E-Learning, communicating by email, oral presentations, and evaluations will underpin students' creative practice and research.**
Enterprise	- **Appreciating the designer, audiences, clients and market relationship and understanding different trends that will allow students to engage with the commercial and entrepreneurial thinking related to interior design discipline.**

4.1.4 Assessment Methods

Assessment Methods were designed with a regulatory consideration to the university assessment procedures of having a midterm exam and a final exam which affected the weight of the coursework and the nature of the course, while the case study in this paper is totally focusing on the coursework assessment where the forecasting techniques were applied and examined. *(Table 4)*.

Table 4- Assessment Methods. Copyright: The author.

Assessment Methods		
Assessment 1 (Coursework) - Practical skills assessment (PR-OT) - Oral presentation (PR-Oral) - Data Exercise (CW Data) - Other coursework (CW-OT)	**Assessment 2 (Final Exam)** - Unseen examination (Ex1)	**Assessment 3 (Final Exam)** - Unseen examination (Ex2)

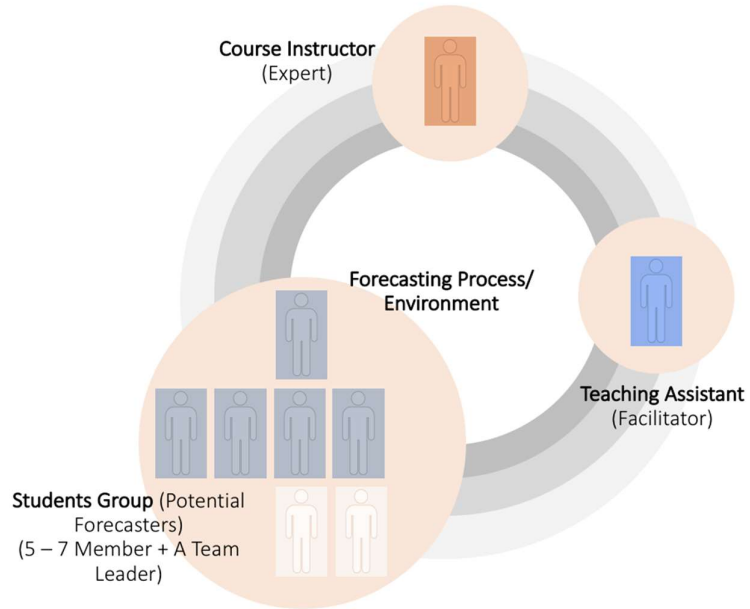
4.2 Participants Structure

Participants structure was a simulation to the general forecasting model that is based on a consensus methodology, where experts, facilitators, team leaders and potential forecasters get involved together in the forecasting process. It is the method followed in trend forecasting procedures of the most of disciplines, It is originally based on the philosophy of Delphi technique that group judgments are more valid than individual judgments. (Hyndman, R.J., & Athanasopoulos, G. 2018).

A total number of 70 students were enrolled in the course for the spring semester of 2018/2019. Students were introduced to group work benefits as well as group ethics. They were asked to build a team consist of 5 to 7 members including a team leader. *(Table 5)* They were privileged with the practice of freedom to choose their peers in the same group, also voting for the team leader among them and the teaching assistant who will play the role of the facilitator. All the mentioned procedures were executed under the supervision of the course instructor. *(Fig. 5)* The groups were created in the following manners:
- The students worked collaboratively.
- The groups' sizes 'close in number.
- The peer leader was meant to monitoring tasks distributions, time management, reporting progress, and also challenges experienced by the group for corrective actions needed. This happened under the supervision of the course instructor and the facilitators. Also, other team members were asked to validate peer leader reports on regular basis.

Table 5- Participants Structure-Students Numbers. Copyright: The author.

Group No.	Trend Name	Group Members Numbers		
		Team/Peer Leader No.	Members/Peers No.	Total No.
1	Animism	1	5	6
2	Bionics	1	6	7
3	Brutalism	1	6	7
4	Kinship	1	4	5
5	New Memphis	1	6	7
6	Palimpsest	1	6	7
7	Psychotropical	1	6	7
8	Slow Future	1	6	7
9	Terrazzo	1	6	7
10	Totemism	1	6	7
11	Youth Tonic	1	6	7



(Fig. 5) –Participants Structure in forecasting process/Environment. Copyright: The author.

4.3 Theme Implemented

"The best way to predict future is to create it", A whole vision was driven by this motto that led to a new platform of interior design trends through presenting 11 projects that have been predicted, formulated and documented by students of interior design in their year of graduation, through the academic course of "Forecasting Interior Design Trends". The top trends reflect time spirit, innovation, and surprising directions.
"Shaping the new edition of Milan Design Week for the year 2020-2021", was the theme given to the students, in which they were encouraged to thoroughly investigate, evaluate, and forecast a design trend. It was important to note that, despite attempts to define design's research approach and develop it more explicitly as a research discipline in its own right, there remains little agreement about the limits of what counts as "design methodology" in an academic sense for the students' research projects (Kimbell, L., 2011).

4.4 Study Tools

The study was analysed in six main aspects:

4.4.1 Tasks configuration: An individual/group follow ups were taking place to assure conducting individual/group tasks and responsibility.

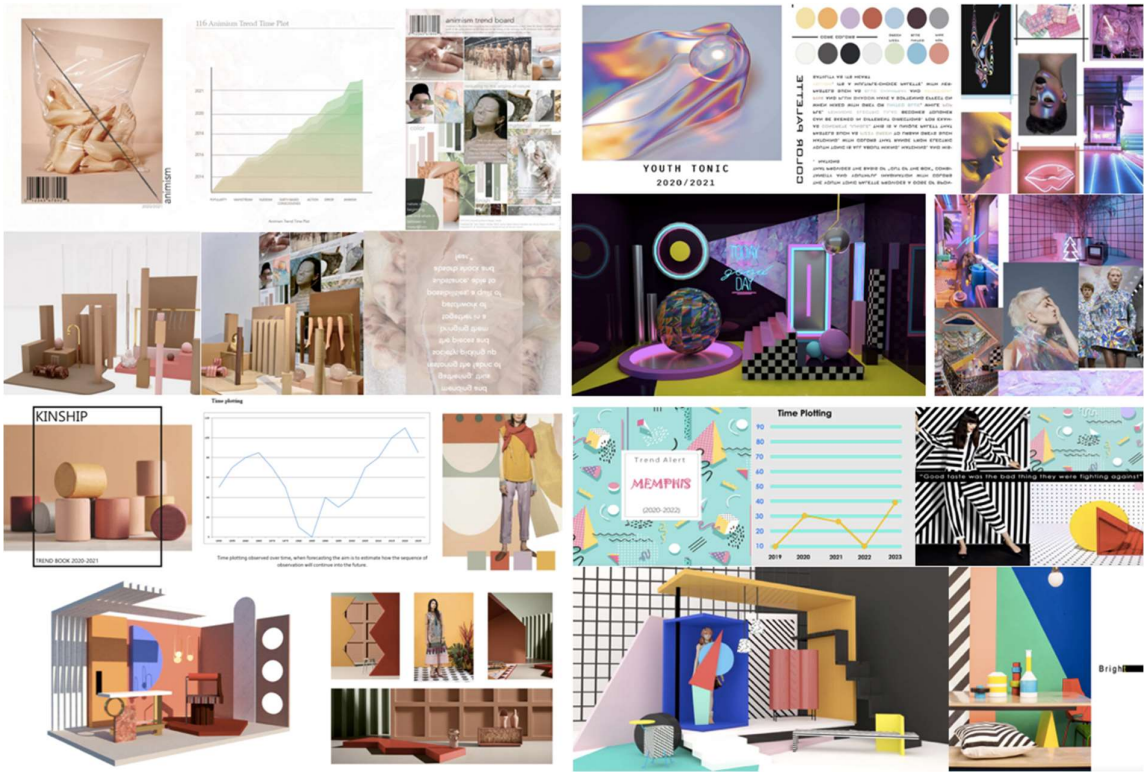
4.4.2 Students Projects: The design trend proposals, ideation, concept a generation, concept evaluation and applications were analysed and categorized based on the design brief introduced to students in each phase of the course, knowledge, requirements, creativity. Scoping final products of the design process was an integral part of the educational outcome of the course program which students presented a trend book, trend board and a set design documenting forecasting process, time plotting, qualitative and quantitative methods of work, surveys, marketing analysis, casual models of production and visual researches. As the first part of the project, the trend book presented the trend vision in colours, fabrics, shapes, and styles based on the most cutting-edge consumer attitudes identified by the trend team over a specific time horizon. As a physical language, it was an invaluable forecasting tool for the world's best designers and retailers, assisting them in making sound decisions on how to react to future change. The trend books included the consensus of the search of a credible database, expressive keywords, systematic approach, forecast evaluation, users' concerns, gathered information on the suggested trend regarding; definition, philosophy, reflection on applications and the final product (CMF), season reflection, forecasting models, analysed data and documented surveys, time plot analysis to past trends, and main driving forces. Trend boards are inspiration boards that provide an aesthetic display of colours, themes, materials, textures, silhouettes, and moods. Their primary objective is to provide information to clients in a simple, visually appealing manner, while trend set design, or scenic design, aims to support the overall artistic goals of the production, conceptual ideas, the content and values with visual elements. An introduction to concept design formulation, as well as an overview of the projects and their design concepts, are given in this section. Design concept creation is the mechanism by which students were approaching different design ideas for a particular problem. The presence of a conceptual framework aided students in thinking in context and remaining focused on specific design goals and intents at all times. Students were exposed to some ongoing micro trends that affect design as a finished product, including colours, materials, and finishes, as well as all other aspects, so that they could function within its context, which includes the forecasting phase.
This justifies the suggestion of combining academic research with a design project, since design is considered to be a synthesis of many other disciplines, and this definition is especially applicable to the interior design approach, which is concerned with understanding users in terms of culture, attitudes, and characteristics.

From design analysis to a completed design project, the students went through a rigorous process that included design issue recognition, design thinking, verbal communication, and past and present data collection. Sketches and 3D models were used to explore and reflect visual aspects of the design. Throughout the analysis and concept creation process, their proposals underwent a significant transformation. It has to be noted that visual representations in the students' projects, are used as an aesthetic problem-solving process, in which the conceptual ideas of the design projects are consolidated in visual form (*Table 6).*

Table 6 - Trends that have been studied and has been a question for forecasting applications. Copyright: The author.

Group No.	Trends Names	Trends Philosophy
Group 1	**Animism**	Animism is the belief in the existence of a spirit and consciousness of all things. Reincarnation is a belief in regeneration and reincarnation as another person, an animal, or a plant in animistic faiths.
Group 2	**Bionics**	Bionics influenced engineering is the research and design of engineering systems and modern technology using biological methods and systems found in nature.
Group 3	**Brutalism**	Brutalist architecture is a 1950s architectural trend. Huge, monolithic, and 'blocky' structures with a rigid geometric form and large-scale use of poured concrete characterise Brutalist architecture.
Group 4	**Kinship**	It has to do with the social structure that binds families, communities, and even whole societies together. Kinship is the system of social relationships that form an integral part of the lives of humans in all cultures, according to anthropology.
Group 5	**New Memphis**	Memphis design has a background of textiles and is a funky style with a distinct contemporary look. The pattern can be traced back to the 1980s. The concept was breaking the mainstream, revive, refresh and reshape what was once convinced as art.
Group 6	**Palimpsest**	A palimpsest is a handwritten page from a scroll or a book used in literary studies. The philosophy illuminates the beauty of decay, which may challenge the logic of development.
Group 7	**Psychotropical**	It's a branch of the psychedelic movement that's just getting started. Vibrant palettes, vivid tropical patterns and prints made by digital engineering, and distorted visual cues borrowed from nature describe psychotropical.
Group 8	**Slow Future**	Into Slow Future, is about remembering the past in order to imagine the future direction.
Group 9	**Terrazzo**	Terrazzo makes it simple to use recycled glass, as well as stone or marble salvaged from other structures and re-crushed and sieved for use in terrazzo.
Group 10	**Totemism**	A philosophy of belief in which humans are claimed to have kinship or a supernatural connection with a spirit-being, such as an animal or plant.
Group 11	**Youth Tonic**	It's propelled by a fresh youthful spirit that's pervading markets and categories, promoting bolder, more expressive designs.

Students' projects presented in this paper are selected from the course work done. Development and implementation of trends Philosophy were examined in different phases of production *(Fig. 6).*



(Fig. 6): Collection of students projects that have been examined through the course. Copyright: Forecasting Teams -used with permission.

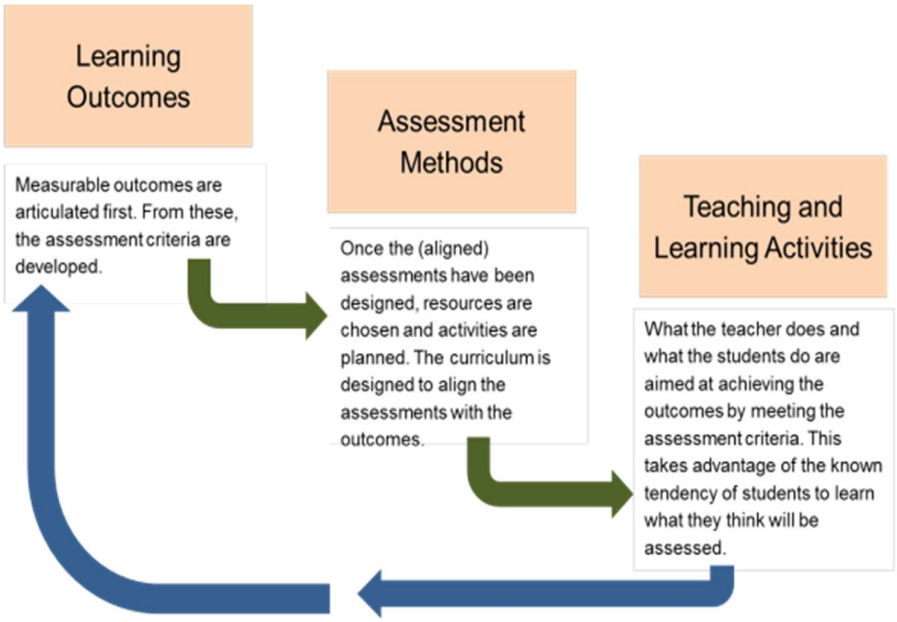
All projects were targeting ongoing trends, accomplishing all requirements, following the forecasting process and applying the same techniques. The differences highlighted each group' efforts, time and efforts put in each phase of the project (Trend book, Trend Board and The Trend set design), level of interaction, critical thinking skills, presentation skills.

- **Group 1** showed more creativity compared to their peers in all phases of the project trying to spotting the trend philosophy and semantics in a minimal way that highlighted their strong critical thinking skills and highly exceeded the instructor' expectations.
- **Group 2** added a technological theme to their project but they faced some barriers in the process of the form generation.
- **Group 6** showed a retreat in conceptualizing the trend theme and philosophy, also the process of form generation did not meet the instructor' expectations.
- **All other groups** worked in alignment with the work flow of each phase and achieved close results.

4.4.3 Group Interaction: An observation of the students' interactions with each other and with both the facilitator and the instructor was documented in a timeline through the project phases.

4.4.4 Learning Outcomes: Learning outcomes are always assessed through both the delivery, teaching strategies and the assessment methodology (Lopez, C. L. 2001). Students can be at the core of the standard of teaching and learning and dramatically add value, which can become apparent in the achieved learning outcomes when implemented in a realistic and informative manner, integrating all stakeholders in the learning process (Adamson, L. and others. 2010) *(Fig. 7)*. Students become co-

responsible for the consistency of the learning process as they are involved in identifying learning outcomes and assessing their success as part of a process of practical reflection and co-creation. Assessment were conducted based on both the group work production, and the individual efforts to accomplish assigned tasks distributed. Same group members' grades were close in each phase/piece of assignment of the project.



(Fig. 7) - Block diagram showing the relationship between assessment, delivery and the outcome. Copyright: The author.

4.4.5 Students Satisfaction: Student feedback is critical for course development, and student suggestions are used to improve both course management and teaching/learning strategies (Lokhoff, J., Bas Wegewijs, and others, 2010). The opinions of students were collected in a number of ways, including the following:

- Informal conversations with the Tutor and appointments with academic staff.
- Online questionnaires at the end of the course, in which students will be asked to reflect on their overall experience. Course teams and central support providers ensure that privacy and confidentiality are maintained in these situations.

4.4.6 Development Criteria: Students development abilities were observed during the group discussions that were taking place on regular basis through the course.

5. STUDY FINDINGS- DISCUSSION & CONCLUSION- RECOMMENDATIONS

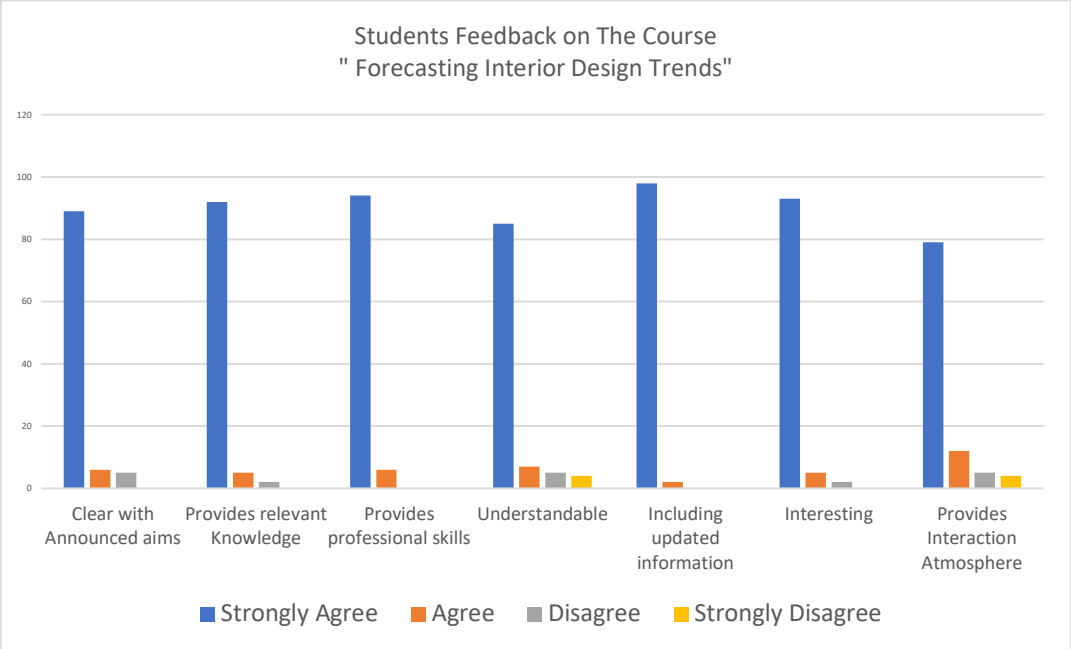
5.1 Study Findings

- Most of the students showed a high level of satisfaction and engagement. Numerical Results of End of course online questionnaires are mentioned *(Table 7)*.

Table 7 - The numerical relationship between students' selection and course criteria of evaluation. Copyright: The author.

Criteria	Format No.	Answers No.		Strongly Agree		Agree		Disagree		Strongly Disagree	
		No	%	No.	%	No.	%	No.	%	No.	%
Clear with Announced aims	85	85	100	76	89	5	6	4	5	0	0
Provides relevant Knowledge	85	85	100	78	92	4	5	2	2	0	0
Provides professional skills	85	85	100	80	94	5	6	0	0	0	0
Understandable	85	85	100	72	85	6	7	4	5	3	4
Including updated information	85	85	100	83	98	2	2	0	0	0	0
Interesting	85	85	100	79	93	4	5	2	2	0	0
Provides Interaction Atmosphere	85	85	100	67	79	10	12	4	5	4	5

The outcomes revealed the selections' diversity but almost 98% of students strongly agreed that the course includes updated information which scored the biggest number of agreement among almost all students out of 85 that proves the relationship between the course content and the zeitgeist. It is also obvious that the agreement category of selections scored the highest numbers among students while the disagreement selections have the least category *(Fig. 8).* Students also reported that the way groups were structured and tasks were distributed encouraged each of them to work on his task passionately without stress. Also they mentioned that the methodology of assessment that was announced to them in an early stage of the course reflected positively on their cumulative grades.



(Fig. 8) - Bar chart showing the proportional relationship between students' feedback on Course criteria of Evaluation. Copyright: The author.

- Learning Outcomes assessment was conducted to establish a clear and unambiguous standards of achievement for each learning outcome. The study findings show that the letter grades of students enrolled in the course ranges from A to C+, also the results indicate that the most number of students got B+, while no failure recorded. *(Table 8)*

Table 8 – Students Letter grades. Copyright: The author.

Grading System	No. of students	Total No. of Students
(A): ≥ 90%	5	70
(A-): ≥ 85% -<90%	13	
(B+): ≥ 80% - <85%	25	
(B): ≥ 75% -<80%	14	
(B-): ≥ 70%- <75%	11	
(C+): ≥65% - <70%	2	
(C): ≥60% - <65%	0	0
(C-): ≥56% - <60%	0	0
(D+): ≥53% - <56%	0	0
(D): ≥50% - <53%	0	0
(F): <50%	0	0

An example of the learning outcomes assessment to selected students is shown to give a brief on the whole process of assessment conducted. Students selection was based on representing letter grades categories *(Table 9)*.

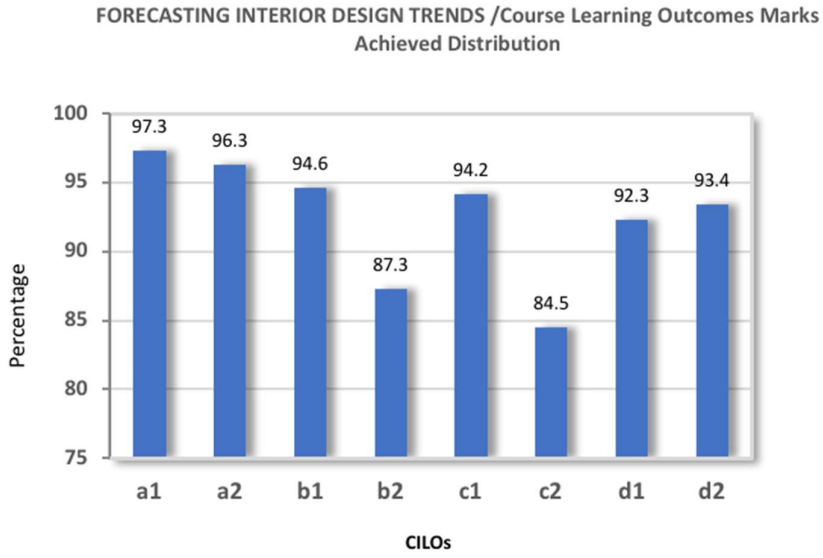
Table 9 – Example of students' learning outcomes assessment representing letter grades categories. Copyright: The author.

No.	Trend Name	Learning Outcomes ILOs									
		A. Knowledge & understanding		B. Cognitive Skills		C. Practical Skills		D. Generic Skills		Grade	Letter Grade
		10	10	15	15	15	15	10	10	**100**	
		A1	**A2**	**B1**	**B2**	**C1**	**C2**	**D1**	**D2**		
Student 1	**Animism**	9	9	13	14	13	14	9	9	**90**	**A**
Student 2	**Bionics**	9	8	13	14	12	12	8	9	**85**	**A-**
Student 3	**Kinship**	9	8	12	11	12	12	8	8	**80**	**B+**
Student 4	**Slow Future**	8	8	12	10	12	10	7	8	**75**	**B**
Student 5	**New Memphis**	7	7	10	9	11	12	7	7	**70**	**B-**
Student 6	**Palimpsest**	7	7	10	10	10	8	7	6	**65**	**C+**

Course Intended Learning outcomes (CILOs) assessment shows the achievement of all learning outcomes that were designed in the course. A slight difference was observed in the percentage of achievement of A1, A2 while both outcomes were the highest in the percentage of achievement among students since students were introduced to trends knowledge on different levels. Some students as previously mentioned were facing difficulties applying their trend theme and philosophy into their designs as a part of practical skills. Overall, (CILOs) assessment states that learning outcomes were moderately aligned. *(Table 10)*

Table 10 – Learning outcomes Assessment. Copyright: The author.

		A1	A2	B1	B2	C1	C2	D1	D2
Course Learning Outcomes Assessment	**Achievement %**	**97.3**	**96.3**	**94.6**	**87.3**	**94.2**	**84.5**	**92.3**	**93.4**
	Achievement Status **Achieved Not/Achieved**	**Achieved**	**Achieved**	**Achieved**	**Achieved**	**Achieved**	**Achieved**	**Achieved**	**Achieved**



(Fig. 9) - Bar chart showing percentages of achievements of CILOs. Copyright: The author.

5.2 Discussion & Conclusion

In answer to the questions formulated in the problem statement and adopted as the aims of this research, the author discusses the following questions in relation to results:

- *What is the significance of integrating trend forecasting techniques in design education?*

Trend forecasting is a common design tool for analysing current and potential future trends. It which go by a variety of names to convey the same meaning; however, it basically emphasises the knowledge and understanding of current and future design trends. A trend should be easy to spot and segment in a straightforward manner, rather than being produced. The importance of trends forecasting refers to the fact that it assists designers in making better decisions today, as well as anticipating potential outcomes in the form of opportunities and challenges, and assisting in preparing to combat them. The value of a multidisciplinary approach is one of the study's major findings. The idea that forecasting is merely "science" is met with scorn by its practitioners. This notion is challenged in the course, which claims that futurologists and forecasters are "as much "researchers" as artists are "sketchers."

- How can the methods of forecasting used in design education reflect on generating innovative *ideas?*

The course topics designed to be related to the design process' artistic, philosophical, and practical aspects. For describing methods of forecasting as a pedagogical strategy, three scenarios emerged. The first characterised the course as a venue for materialistic experimentation through creative reflection and collaboration. The second described it as a culture of self-organizing structures that allow for an open-ended process of exploration guided by the instructor. The third characterised it as a setting for the development of a set of essential elements/skills that prepare students for potential professional careers. Despite the differences between the three scenarios, they all have a few things in common when it comes to defining important skills for students to practise in the classroom to reflect on generating innovative ideas. First, in such a setting, communication among students and with the instructor was an important skill to learn in order to demonstrate ideas verbally and visually. Second, collaboration was an essential skill for students to acquire. Students' collaboration with each other allowed them to build teamwork techniques that helped them advance in their careers. Third, students used imagination and self-expression to build and produce unique design proposals. Finally, students' ability to conduct

reliable research is important for making well-informed design decisions. The author conducted a trend analysis of the students' projects and identified potential design directions that could become the most common in the coming years. Analysing the projects of the students has shown a slew of potential future paths in design thinking in general. The findings also revealed the students' tendencies to be aware of global and international design directions, as well as the strong impact of globalisation on design thinking and design decisions made in the process. This influence may be important to the hypothesis that the planet is experiencing a combination of cultures because of creativity and the ease of accessing to the lifestyle of others. The methods used in the course to convey 'forecast' knowledge used a variety of methods. While visual information is essential, it is insufficient to express all of the complexities or information involved. When the timescale of these predictions is extended, stories or scenarios are popular. These insights become wider and less established as we look forward into the future – the more philosophical the approach. Factual evidence is useful, but it should not be the guiding force in such situations.

Students were given the task of working on a design research project that would have two stages: the first was to design a trend book that includes a selected forecasted trend that is driven by their vision and supported by all forecasting techniques used to forecast the trend's life cycle, and the second was to explore and analyse a pattern that carries the dominant features of the selected trend to be presented in a trend board and accordingly shape a solid result that combines both the practical and philosophical aesthetical aspects of a trend in expressive set design .Students were advised to do some individual activities as an approach to start spotting trends, those activities included; visiting trade fairs and design events, checking lifestyle magazines, surfing the Internet; searching for popular culture worldwide, watching past fashion shows and track past trends, linking signals, and shaping them into a vision of what the future may be. Through each step, students followed a research approach that directs the advancement of research in the cycles of action research and uses visual art aids as a catalyst for creation. Each period of action research starts with planning, setting targets, and investigation of socio-cultural circumstances in the culture of the trend's birth. As research material, activities were observed and recorded.

- *What would be the impact of adopting such a pedagogy of integrating forecasting techniques in design education on students' learning experience?*

The learning experience was intended to be rich in gaining different skills through the involvement in lots of activities. Students were given the task of working on a design research project that would have two stages: the first was to design a trend book that includes a selected forecasted trend that is driven by their vision and supported by all forecasting techniques used to forecast the trend's life cycle, and the second was to explore and analyse a pattern that carries the dominant features of the selected trend to be presented in a trend board and accordingly shape a solid result that combines both the practical and philosophical aesthetical aspects of a trend in expressive set design .Students were advised to do some individual activities as an approach to start spotting trends, those activities included; visiting trade fairs and design events, checking lifestyle magazines, surfing the Internet; searching for popular culture worldwide, watching past fashion shows and track past trends, linking signals, and shaping them into a vision of what the future may be. Through each step, students followed a research approach that directs the advancement of research in the cycles of action research and uses visual art aids as a catalyst for creation. Each period of action research starts with planning, setting targets, and investigation of socio-cultural circumstances in the culture of the trend's birth. As research material, activities were observed and recorded.

Through the study, It became obvious that the collaborative activities boosted the sense of confidence and cooperation between students. The involvement that happened throughout the different phases of the project reflected the communicative attitude. Additionally, Studies show that the use of trend analysis and related approaches in the design industry has increased dramatically in recent years. Its 'public profile' has risen to the point that design-led businesses are now able to engage in a more open

conversation about the approaches they use. The author believes that further research is needed within the design industry to determine whether and where different approaches to trend forecasting are being used. The author conducted a trend analysis of the students' projects and identified potential design directions that could become the most common in the coming years. The study concludes with practical advice for educators on how to create an anticipatory, positive culture of change in learning, teaching, and evaluation that is focused on incorporating trends forecasting techniques in design education. Finally, using forecasting methods in design education can be considered an example of using creative practices and creativity in education. Innovation is best suited to practise that use technology or technologically improved materials, procedures, and facilities to improve curriculum-related standards of instruction. To put it another way, technology makes it easier to provide content to students.

5.3 Recommendations

- Adopting Interdisciplinary approaches in design education.
- Investigate recent pedagogies and strategies to optimize the innovative design educational process.
- Spreading the awareness of the significance of integrating forecasting techniques in design education.
- Using forecasting methods in design education to generate creative practices and innovation in education.
- Engaging students in more collaborative learning activities.

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