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अनुक्रमणिका

भारतीय वेद आणि उपनिषदांमधील शास्त्र

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सारांश :

भारतीय वेद, उपनिषद व इतर पौराणिक ग्रंथ यांचे शास्त्रीय महत्त्व या विषयावर लिहीत असताना असे लक्षात येते की चार वेद, अठरा पुराणे, एकशे आठ उपनिषदे, सहा शास्त्रे ही भारतीयांची फार मोठी ठेव आहे. ज्ञान-विज्ञानाचा अतिशय मौल्यवान खजिना या ग्रंथातून आपल्याला दिसून येतो. अनेक देश-विदेशातील विद्वानांनी वेद, उपनिषदांचा अभ्यास व संशोधन केले आहे आणि त्यांचे महत्व व महात्म्य स्वीकारले आहे. खगोलशास्त्र, स्थापत्यशास्त्र, भौतिकशास्त्र, गणितीयशास्त्र अशा अनेकविध विषयांवरील उदाहरणाचे दाखले देऊन वेद उपनिषदांचे शास्त्रीय महत्त्व मांडण्याचा या शोधनिबंधातून प्रयत्न करण्यात आला आहे.

सांकेतिक शब्द : वेद, उपनिषद, विज्ञान, ज्ञान, नासदीय सूक्त.

भारतीय संस्कृती जगात श्रेष्ठ आहे आणि त्याचे आधारस्तंभ आहेत. भारतीय शास्त्रांना दोन भागांमध्ये विभाजित केले गेले आहे, श्रुती आणि स्मृति. श्रुतीच्या अंतर्गत धर्मग्रंथ, वेद येतात आणि स्मृतीच्या अंतर्गत इतिहास आणि वेदांची व्याख्या करणारे पुस्तके, पुराण, रामायण, महाभारत इत्यादी येतात. हिंदूंचे धर्मग्रंथ वेद आहेत आणि वेदांचा सार उपनिषद आहे आणि उपनिषदांचा सार गीता आहे. वेद हे जगातील पहिले साहित्य आहे. वेद हे मानवाच्या कल्याणासाठी निर्माण केले गेले. वेद या शब्दाचा अर्थ ज्ञान किंवा विद्या आहे. भारतीय संस्कृतीच्या या मूलाधार ग्रंथामध्ये ब्रह्मा/ईश्वर, देवता, ब्रम्हांड, गणित, रसायन, औषधे, प्रकृती, खगोल, भूगोल, धार्मिक नियम, इतिहास, राष्ट्रदर्शन, लोकजीवन, रितीरिवाज, तत्त्वज्ञान इत्यादी विविध विषयांची माहिती अभ्यासाला मिळते.

अनेक तत्त्वज्ञ व अभ्यासकांनी आपल्या भारतातील वेदांवर चिंतन व संशोधन केले आहे. जर्मनचे प्रसिद्ध तत्त्वज्ञ शोपनहॉर् यांच्या म्हणण्यानुसार जगातील संपूर्ण साहित्यिक ग्रंथाचा अभ्यास करता असे दिसून येते की मानव विकासासाठी हितकर आणि मानवाला सर्वोच्च पातळीवर नेणारे ज्ञान जितके उपनिषदांमधून मांडण्यात

कर्ता आणि रचयिता परमेश्वर आहे व त्याच्या संकल्पातून हे विश्व निर्माण झाले आहे असे प्रतिपादन करून माणसाच्या जिज्ञासेला व सर्व प्रश्नांना अंतिम उत्तरे देऊन पूर्णविराम दिला आहे व त्यामुळे भारतीयांची विज्ञानात प्रगती झाली नाही असा फार मोठा गैरसमज बहुतांश सर्वच विचारवंतांमध्ये आपल्यास दिसतो. या गैरसमजुतीमुळे पाश्चिमात्य विद्वानांनी नकारात्मक भूमिका मांडली. असे दिसून येते की खरे तर पाश्चिमात्य वैज्ञानिक सिद्धांत व प्राचीन भारतीय ग्रंथातून मांडण्यात आलेले वैज्ञानिक तत्व परस्परांना समांतर आहेत. हे समजून घेण्यासाठी खालील काही दाखल्यांच्या अभ्यास करूया.

आधुनिक विज्ञानानुसार आवाज म्हणजे कंपन. जेव्हा कंपन तयार होते तेव्हा आवाज निर्माण होतो. किंबहुना आवाज निर्मितीसाठी माध्यमाचे कंपन होणे आवश्यक आहे. कंपनाची आवर्तने यावर आवाजाची प्रत (उंची, उतार, दर्जा) ठरविले जाते. कंपनाद्वारे निर्माण होणाऱ्या कंपन शक्तीचा दाब जेव्हा माध्यमावर पडतो त्यानुरूप माध्यमाचा आकार (प्रसरण अथवा आकुंचन) तयार होतो. याच आधारावर बनारस हिंदू विश्वविद्यालयातील विद्यार्थ्याने कालभैरव स्तोत्राचे पठण केले असता प्रत्यक्ष कालभैरवाची आकृती पटलावर उमटते हे सिद्ध केले. पुरातन ग्रंथांमध्ये वेदमंत्र शक्तींना अनन्यसाधारण महत्व दिले गेले आहे पण त्या मागील शास्त्रीय तत्त्वांचे महत्त्व ओळखले गेले नाही. तसेच सन १९६१ मध्ये फ्रान्स मधील डॉक्टर बॅट्स हॉजेस या संशोधिकेने एडॉफोन नावाच्या यंत्राद्वारे केलेल्या प्रयोगातून सुद्धा हेच सिद्ध केले. डॉ. बॅट्स हॉजेस यांनी एडॉफोन यंत्रावर कोपोडियम डस्ट टाकली व बंद खोलीमध्ये यंत्र समोर प्रसिद्ध गायिका मादाम फिनलंड यांनी ओइव मारियाचे स्तोत्र गायिले तेव्हा गायिकेच्या स्वर कंपन्यांनी त्या यंत्रावरील कोपोडियम डस्ट कंप पाऊ लागली व तबकडीवर मेरीचे बाल येशु सह चित्र उमटले. या प्रयोगांमधून हे सिद्ध होते की लयिचा व सहकंपनांचा परिणाम मानवी देहा भोवती होत असतो. सुस्वर पाठाने आजूबाजूचे वातावरण बदलते, संयुगे बदलतात, साधकाच्यासमोर आकृतिबंध प्रकटतात, त्या दर्शनाने साधक तेजः पुंज होऊ लागतो. आपण ज्या ज्या गोष्टींचा धार्मिक उपासनेमध्ये समावेश करतो त्या सर्वांचे आपल्या पूर्वजांनी विज्ञानाच्या कसोटीवर परीक्षण केले असता ज्या गोष्टी वैज्ञानिक आहेत त्यांचे महत्त्व कळून येईल व ज्या गोष्टी अर्थहीन आहेत त्यांचा आपण त्याग करू शकू. म्हणूनच वेद पुराणातून प्रस्थापित केलेल्या सर्व धार्मिक गोष्टींना अर्थहीन म्हणणे चुकीचेच आहे. बहुतांशी धर्मांच्या उपासनेमध्ये स्तोत्र, मंत्र, बीजाक्षरे यांचा प्रामुख्याने समावेश दिसून येतो. कोणत्याही स्तोत्राचा किंवा मंत्राचा पाठ करताना उत्पन्न होणारे कंपने विज्ञानाच्या मदतीने मोजता येतात.

आले आहे तेवढे इतर ग्रंथातून आढळून येत नाही.

वेद आणि उपनिषदांमधील विज्ञान याबद्दल चर्चा होत असताना अनेक वेळा वेदांमधून वैज्ञानिक तत्वांपेक्षा अध्यात्मावर अधिक भर दिला गेल्याचा आरोप केला जातो. परंतु अधिक दृढतेने विचार करता असे लक्षात येते की विज्ञान आणि अध्यात्म यांना विभागणारी सीमा रेषा अतिसूक्ष्म व पुसट आहे. आईन्स्टाईनने देखील एका ठिकाणी म्हटले आहे की, Science without religion is lame, religion without science is blind.[1,2]. छांदोग्य उपनिषदातदेखील अतिशय सुंदर विचार मांडण्यात आले आहे ते असे,

"सत्य जाण्याची इच्छा करावी"

"सत्य जाणू इच्छिणारा विज्ञानाची इच्छा करतो"

"मनन होते तेव्हाच विज्ञान होते"

"श्रद्धा ठेवतो तेव्हा मनन होते"

"निष्ठा ठेवतो तेव्हा श्रद्धा ठेवली जाते"

"कृती कर्म करतो तेव्हा निष्ठा असते"

"सुख मिळते तेव्हाच मनुष्य कर्म व कृती करतो"

या उपनिषदिय विचारांमधून एक सहज वैज्ञानिक सिद्धांत मांडला गेला आहे तो असा की विज्ञान निसर्ग नियमांना जाणून घेण्यासाठी प्रश्न विचारतो, उत्तर शोधतो व मननाद्वारे तर्कावर आधारित सिद्धांत मांडतो व गणितीय पद्धतीने ते सिद्धांत सिद्ध करतो[३]. या कृतीमागील उद्देश सुख मिळविणे व सत्य जाणून घेण्याची इच्छा दिसून येते आणि म्हणूनच वेद आणि विज्ञान सतत हातात हात गुंफून पुढे जात असल्याचे दिसते.

विज्ञान हा शब्द सायर आणि सायन्यशिया या लॅटिन शब्दापासून आला असून याचा अर्थ सत्य जाणणे असा होतो. विज्ञान म्हणजे आपल्या सभोवतीच्या नैसर्गिक घटनांचे सत्य जाणणे होय. वेद, उपनिषद, रामायण, महाभारत आणि गीता या धर्मग्रंथात अध्यात्मिक ज्ञानावर भर आहे परंतु त्याच सोबत निसर्गाचे, जीवनाचे गुढ उकलण्याचा प्रयत्न झाला आहे. अध्यात्माबरोबरच वैज्ञानिक सत्याची प्रचिती या ग्रंथांमधून दिसून येते. गीतेमध्ये श्लोक क्रमांक ७.४, ७.५, ७.१४, ९.४, १४.४, १५.६ इत्यादीमधून श्रीकृष्णाच्या तोंडी विश्वाचे रहस्य सांगण्याचा प्रयत्न झाला आहे. परंतु त्या काळात या सैद्धांतिक ज्ञानाच्या आधारे उपकरणे बनविली नव्हती. आपल्या या पौराणिक ग्रंथांमधून मांडण्यात आलेल्या विज्ञानाधिष्ठित अध्यात्माचा व्यावहारिक व प्रात्यक्षिक उपयोग न होता त्याला देव धर्माला जोडल्याने वैचारिक घोळ उत्पन्न झाल्यासारखे भासते[४]. वेदांनी किंवा भारतीय तत्वज्ञानानी विधाव

अथर्वशीर्ष इत्यादी स्तोत्रांचा पाठ केल्याने उत्पन्न होणारी कंपने मोजणारी यंत्रे आता आधुनिक विज्ञानाने तयार केली आहेत.

ऋग्वेदातील नासदीय सूक्त यांमध्ये असे विधान करण्यात आले आहे की तत्कालीन अबोध सृष्टी स्वबलाने वायू शिवायचं श्वासोश्वास करत स्फुरत होती. त्याखेरीज अथवा त्या पलिकडे अन्य काहीच नव्हते[६]. सूक्तकारांनी मांडलेल्या या विधानातील प्रत्येक शब्द लाख मोलाचा, शंभर टक्के विज्ञान पूर्ण, विज्ञाननिष्ठ आहे. प्रत्येक शब्दाचा स्वतंत्र विचार करणे आवश्यक आहे, द्रव्य, ऊर्जा, आणि आकाश यांच्या संयुक्त मिश्रणाची अवस्था म्हणजेच अबोध सृष्टी असे म्हटले गेले असावे. ही सृष्टी अबोध असली, अप्रकट असली, तरी तिच्यात स्वतःचेच स्वयंभू असे बल होते. आणि म्हणूनच वायु शिवाय श्वासोश्वास करत ही सृष्टी स्फुरत होती, म्हणजेच तिथे स्पंदन तयार होत होते. सुप्तकार पुढे म्हणतात की तप महात्म्याने प्रकट झालेले सर्वव्यापी ब्रह्म फोल मायने अच्छादिले होते म्हणजेच अबोध सृष्टीमध्ये जे स्पंदने निर्माण होत होती त्यातून निर्माण झालेले ऊर्जेचे महात्म्य, म्हणजे महापरीस्फोटातून निर्माण झालेल्या ब्रम्हांडाची (अवकाश व त्यातील अगणित आकाशगंगा) निर्मिती दर्शवते. हेच तत्व आधुनिक वैज्ञानिकांच्या बिग बँग प्रयोगातून दिसून येते.

बिग बँग सिद्धांतानुसार, महास्फोट झाल्यानंतर प्रचंड प्रमाणावर ऊर्जा बाहेर पडली. सुरुवातीच्या काळात सुमारे ५.५ अब्ज अंश सेल्सिअस तापमान होते, असे शास्त्रज्ञांचे म्हणणे आहे. या ऊर्जेतून विविध घटक बाहेर पडत होते ते प्रसरणामुळे थंड झाले व काही सेकंदातच प्रोट्रॉन, न्यूट्रॉन, पॉझिट्रॉन, इलेक्ट्रॉन यांसारखे अतिसूक्ष्म कण तयार झाले. विश्व पुरेसे थंड झाल्यानंतर या अतिसूक्ष्म कणांपासून प्रभाररहीत अणू तयार झाले. प्रसरण पावणाऱ्या घटकांवर गुरुत्वीय बलाचा परिणाम होऊन ते एकत्र येऊ लागले आणि त्यांचे पुंजके तयार झाले. त्यातूनच तारे, ग्रह, आकाशगंगा यांचा जन्म झाला. महास्फोटानंतर तयार झालेल्या हायड्रोजनचा वापर करून आजही नवीन तारे जन्म घेतात.

स्फोटानंतर सेकंदाच्या आत मूलकणही निर्माण झाले. वस्तुमान आणि मूलकणाचे स्वरूप या दोन्हींच्या अभ्यासासाठी जगभरातील शास्त्रज्ञ एकत्र येऊन युरोपमधील 'सर्न' प्रयोगशाळेत प्रयोग करीत आहेत. फ्रान्स आणि स्वित्झर्लंड यांच्या सीमेवर भूगर्भात लार्ज हॅड्रॉन कोलायडर हा मोठा त्वरक (Accelarator) उभारण्यात आला आहे. या त्वरकामध्ये विरुद्ध भार असलेल्या प्रोटॉन्सना वीस किलोमीटर लांबीच्या बोगद्यातून एकमेकांच्या विरुद्ध दिशेने फिरवून टक्कर घडवून आणण्यात आली. या टकरीतून 'बिग बँग' सदृश स्थिती निर्माण होऊन मूलकण मिळाल्याचे दोन वर्षांपूर्वी जाहीर करण्यात आले. या मूलकणांची संकल्पना हिग्ज

आणि निसर्गाचा अभ्यास अतिशय पक्का होता व त्याचा व्यावहारिक उपयोग सुद्धा करण्यात येत असे.

३) कोल्हापूर येथील आदिमाया महालक्ष्मीचे मंदिर हे कमीत कमी एक हजार वर्ष जुने आहे. या मंदिरात भूगोलाचा अभ्यास करून मुख्य द्वार असे बनवले आहे की दर वर्षी विशिष्ट नक्षत्र असताना सूर्याचे पहिले किरण हे देवीच्या चरणांवर पडतात आणि जसा सूर्य वर वर जातो ती सूर्यकिरणे देवीच्या मुखापर्यंत पोहोचतात. हा सोहळा किरणोत्सव म्हणून ओळखला जातो. ज्या लोकांनी हे मंदिर बांधले त्यांचा भूगोल अत्यंत पक्का असल्याशिवाय आणि त्यांचे गणितीय विज्ञान अत्यंत चपखल असल्याशिवाय हे होऊ शकत नाही.

४) वेरूळ लेणीच्या मध्ये असणारे कैलास मंदिर हे जगातील पहिले, आधी कळस मग पाया या पद्धतीने बांधलेले मंदिर आहे. सातव्या शतकात बांधलेले हे मंदिर एकाच शीलाखंडाला कोरून बनवले आहे. कमीत कमी तीन पिढ्या या मंदीराच्या निर्मितीसाठी राबल्या आहेत. त्या काळातील लोकांना एकच इतका मोठा दगड कसा ओळखू आला असेल, त्याचे माप कसे कळले असेल, की त्यांनी बरोबर तीन मजली मंदिर उभे केले. आधी कळस मग पाया या पद्धतीने बनवलेले हे एकमेव मंदिर म्हणजे शिल्पकलेचा आणि तत्कालीन लोकांच्या भूगर्भाच्या अभ्यासाचा एक जिवंत नमुना आहे.

५) सोरटी सोमनाथाचे सुप्रसिद्ध मंदिर आपल्या सगळ्यांनाच माहीत आहे. बारा ज्योतिर्लिंगांपैकी एक असणारे हे मंदिर गझनीच्या महंमदाने सतरा वेळा लुटले होते. या मंदिरात एक बाण स्तंभ आहे. त्या स्तंभावर संस्कृतमध्ये असे कोरले आहे की या स्तंभापासून अंटार्टिकापर्यंत सरळ रेष मारली तर भूमी लागत नाही. या लेखासोबत त्याच्या लिंक सुद्धा दिल्या आहेत. गुगल मॅपचा फोटो सुद्धा दिला आहे. त्या काळातील लोकांच्याकडे आज असणारी कोणतीही सामग्री नसताना सुद्धा ते या पद्धतीची घोषणा कशी करू शकले असतील.

६) कोणार्कचे सूर्यमंदिर संपूर्णपणे लोहकांत दगड वापरून बनवलेले मंदिर आहे. या मंदिराचे वैशिष्ट्य म्हणजे हे लोहकांत दगड एकमेकांचे चुंबकीय बल संतुलित करून घट्ट बसवले होते. त्यानंतर त्यावर शिल्पे घडवली गेली. मंदिराचा कळस हा सुद्धा लोहकांत दर्जाचा होता. आणि तो कळस संपूर्ण मंदिराचे चुंबकीय बल नियंत्रित करीत असे.

आणि ओंग्लेअर यांनी १९६४ मध्ये स्वतंत्र सिद्धान्तांद्वारे मांडली होती. या कणांबद्दल गूढ असल्याने ते जणू 'देव कण' (God Particle) असावेत, असेही मानले गेले[७]. या संशोधनाशी भारताचेही नाते आहे. एकतर आपल्याकडे प्राचीन काळापासून पदार्थ हा कणाकणांनी बनलेला असतो, ही संकल्पना मान्य होती. यावरून आपले असे लक्षात येते की आपले वेद व इतर प्राचीन ग्रंथातून मांडलेले हे ज्ञान थोटांड नाही तर ते संपूर्णतः विज्ञानाधिष्ठित आहे.

आधुनिक विज्ञान व प्राचीन भारतीय वेदातील विज्ञान या विषयावर पुराव्यासह विचार करता असे दिसून येते की २१व्या शतकात अंतरिक्ष आणि विश्व यासंदर्भात झालेल्या नवीन संशोधनातून मिळालेली माहिती व प्राचीन भारतीय अध्यात्मिक तत्वज्ञान यांचे सांगड घातली असता अनेक आश्चर्यकारक तथ्ये समोर येतात. आपल्या पूर्वजांचे आकाश, काल, मिती या संदर्भातील ज्ञान हे आधुनिक वैज्ञानिक संशोधनाशी बऱ्याच प्रमाणात मिळतेजुळते आहे. हे खालील उदाहरणावरून स्पष्ट होते[८].

१) कुतुब मिनारच्या समोरील सोळाशे वर्ष जुना ओतिव लोखंडाचा बनलेला लोहस्तंभ हा २२ फूट उंच, सुमारे ६.५ टन वजन असणारा आहे. ज्याच्यावर एक अत्यंत पातळ असे आवरण चढवले आहे, ज्यामुळे गेली सोळाशे वर्षे या खांबाला गंज लागलेला नाही. आयआयटी कानपूरच्या धातु तज्ज्ञांनी अभ्यास करून असे स्पष्ट केले आहे की एका विशिष्ट रासायनिक प्रक्रियाद्वारे १० मायक्रोनचे आवरण या स्तंभावर असल्यामुळे हा स्तंभ अजूनही गंज पकडत नाही.

२) आंध्र प्रदेश मधील लेपाक्षी मंदिर येथे एक नक्षीकाम असणारा दगडाचा स्तंभ अधांतरी उभा आहे. या स्तंभाचे वजन सुमारे दहा टन तर व्यास दोन फुटाचा आहे. हा अतिभव्य स्तंभ लोहकांत दगडाचा बनलेला आहे, म्हणजेच चुंबकीय गुणधर्म असणाऱ्या दगडाचा बनलेला आहे. तसेच हा स्तंभ ज्या मजबूत पायावर उभा आहे त्या पायाचा दगड देखील लोहकांत दगड आहे. या दोन्ही लोहकांत दगडांचा असा संयोग येथे होत आहे की ते परस्परांना एकमेकापासून दूर लोटतात तरीही ते स्थिरपणे उभे आहेत. या ठिकाणी विज्ञानाचे चुंबकीय परावर्तन हा सिद्धांत काम करतो असे दिसून येते. दोन्ही दगड एकमेकांच्या चुंबकीय क्षेत्रात आले की ते ठराविक अंतरावर स्थिर राहतात. त्यामुळेच हा स्तंभ १००० वर्ष तसाच अधांतरी स्थिर आहे. अजून किती काळ राहील ते माहीत नाही. प्राचीन भारतात गणित-विज्ञान

या मंदिराच्या आत जे राशिचक्र काढले होते ते या पद्धतीचे होते की रोज सूर्य उगवताना ज्या राशीत असेल त्या राशीवर बरोबर सूर्याचे पहिले किरण पडणार. अर्थात रोज राशी बदला नुसार किरणांची जागा बदलणार. येथे उच्च दर्जाचा भूगोल आणि स्थापत्यशास्त्राचा अभ्यास दिसून येतो. हे मंदिर समुद्र किनाऱ्याच्या जवळ आहे आणि त्या भागात समुद्रकिनारा अत्यंत खडकाळ आहे. किनाऱ्याजवळ येणारी जहाजे, त्यातील लोखंड मंदिराच्या चुंबकीय बलाने ओढली जाऊन खडकावर आपटून फुटून जात असत. ज्यावेळी वास्को द गामा भारतात आला त्याच्या दोन जहाजांपैकी एक जहाज याच पद्धतीने खडकावर आदळून फुटले. जहाज फुटण्याला या मंदिराचा काहीतरी परिणाम कारणीभूत आहे हे त्याच्या लक्षात आले व त्याने जहाजावरून तोफा डागल्या. त्यामुळे मंदिराचा कळस निखळला कळस निघाल्याने सगळे चुंबकीय बल असंतुलित झाले आणि मंदिर जवळ जवळ उद्ध्वस्त झाले. नंतर ब्रिटिश कालखंडात ब्रिटिशांना कल्पना होती की आपण हे मंदिर पूर्ववत करू शकत नाही. त्यांनी मंदिराच्या गर्भगृहात चक्क काँक्रीट ठासून भरले.

७) वराहमिहीर हे गणितातील ऋषी, सूक्ष्म देह धारण करून अंतराळात भ्रमण करीत असत त्यांनी काही श्लोक लिहिले आहेत, ज्यात त्यांनी तुम्ही अंतराळ प्रवास करत असाल आणि तुम्हाला जिथे आहात तेथून सूर्य अथवा पृथ्वी दोन्ही सुद्धा दिसत नसतील तरी आपले स्थान (लोकेशन) कसे ओळखावे आणि कसा प्रवास करावा यावर मार्गदर्शन केलेले आहे. मंगळ यान मंगळ ग्रहावर उतरविण्याचा NASA चा पहिला प्रयत्न अपयशी ठरला कारण मंगळ यान मंगळग्रहाच्या उलट बाजूला होते, एका बाजूला सूर्य आणि दुसऱ्या बाजूला पृथ्वी होती यानाला यापैकी काहीही दिसत नव्हते[९]. मात्र भारताने सोडलेले मंगळ यान यशस्वीरित्या मंगळावर स्थिर झाले. यावेळी शास्त्रज्ञांनी, वराहमिहिरने सांगितलेली पद्धत वापरून प्रोग्रॉम बनवला होता व तो अचूक होता. त्यामुळे मंगळयान यशस्वीपणे मंगळावर उतरले.

८) आचार्य कणाद यांनी अणू आणि त्याच्या गर्भातील छोटे पार्टिकल यांच्यावर शास्त्रीय भाष्य केलेले आहे. या लेखावर तज्ज्ञ अशा पाश्चात्य विद्वानांनी सुद्धा शिक्कामोर्तब केलेले आहे.

९) गणित हा भारतीयांनी जगाला दिलेला शोध आहे. शून्यावर आधारित

गणमान पद्धती ही भारताची देण आहे. भारतातून हे ज्ञान मध्य पूर्वेला गेले. अरब लोकांनी ते युरोपात नेले त्यामुळे युरोपियन लोक गणिताला अरेबिक म्हणत आणि अरबी लोक हिंदसा, अर्थात हिंद मधून आलेली गणमान म्हणून हिंदसा म्हणत. यात गणितीय पद्धतीवर आधारित आपले पंचांग हे आज सुद्धा सगळ्यात अचूक आहे. आपल्याकडे पर्जन्यमान दर्शविणारे जितके ग्रंथ आहेत ते नक्षत्रांची स्थिती आणि त्यानुसार पर्जन्य आणि येणारे पीक हा अंदाज वर्तवतात.

१०) पाय हा वर्तुळाचा व्यास मोजण्यासाठी वापरला जाणारा स्थिरांक आहे. पायचे मूल्य बत्तीस अंशापर्यंत असल्याचे शुल्ब सूत्रातून काढले गेले तर आधुनिक विज्ञानाने पायाचे मूल्य २२ अंशापर्यंत काढले आहे.

११) आपण गणना करण्यासाठी जी पद्धती वापरतो त्यात इंग्रजी अक्षरात ट्रायललिओन (Trillion) यापुढे गणना नाही. आपल्या पद्धतीत मात्र पद्मा, महापद्म, अर्व, खर्व, पर्यंत गणना करण्यासाठी शब्द आहेत.

१२) प्राचीन भारतातील सात शिवमंदिरे एकाच अक्षांशावर बांधली गेली आहेत. सर्व मंदिरे एकमेकांपासून कमीत कमी काही हजार किलोमीटर दूर आहेत. असे असताना त्यांना ती एका रांगेत बांधता आली याचा अर्थ त्यांचे भूगोलाचे आणि अक्षांश आणि रेखांशाचे ज्ञान किती परिपूर्ण होते याचे द्योतक आहे.

आजवर अनेक धार्मिक ग्रंथातून समोर आलेल्या ओव्या, श्लोक, उक्ती यांनी काळापलीकडे जाऊन वैज्ञानिक व शास्त्रोक्त माहिती समाजाला दिल्याचे आढळून आले आहे. त्यातीलच एक उदाहरण म्हणजे हनुमान चालीसाच्या मंत्रातील हा अठरावा श्लोक!

''जुग (युग) सहस्त्र जोजन (योजन) पर भानु।
लील्यो ताहि मधुर फल जानू।।''

हनुमानाने सूर्याला फळ समजून खाण्यासाठी झेप घेतली या प्रसंगाचे वर्णन करणाऱ्या या श्लोकात तुलसीदासांनी पृथ्वी ते सूर्याच्या अंतराबद्दल माहिती दिली आहे.

१ युग = १२००० वर्ष
१ सहस्त्र = १०००
१ योजन = ८ मील
युग × सहस्त्र × योजन = पर भानु
१२००० × १००० × ८ मील = ९६००००० मील

१ मील = १.६ किमी

९६००००० × १.६ = १५३६००००० किमी

अर्थातच हनुमान चालीसा नुसार सूर्य हा पृथ्वीपासून १५३६००००० किलोमीटर अंतरावर आहे.

NASA च्या शास्त्रज्ञांच्या गणितानुसार सुद्धा सूर्य आणि पृथ्वीचे अंतर जवळपास इतकेच आहे, यावरून असे सिद्ध होते की भारतीय वेद व पौराणिक ग्रंथ साहित्यमधील विज्ञान अतिशय अचूक आहे.[१०]

आपण पूर्वीपासून विष्णूलोक, शिवलोक, गणेशलोक इत्यादी नावे पुराण कथामधून ऐकत आलो आहोत. प्रत्यक्षात ही नावे विश्वातील अनेक ब्रम्हांडातील अन्य स्थानांची असू शकतात. कदाचित येणाऱ्या काळात आपण त्यांचे भौगोलिक स्थानही निश्चित करू शकू. उदाहरणार्थ शिवलोक हा पृथ्वीपासून पाच अब्ज प्रकाश वर्ष अंतरावर आहे इत्यादी. आधुनिक विज्ञानाची देखील याला निश्चितच पुष्टी मिळू शकेल कारण विश्वात अनेक ब्रम्हांडे आहेत हे स्टीफन हॉकिंग यांनी मान्य केले आहे.

भारतीय ऋषींनी विकसित केलेले विज्ञान हे निसर्ग आणि मानव यांनी शांततापूर्वक सहजीवन व्यतीत करावे असे होते. चीनमधील एक महान विचारवंत कन्फ्यूशियस यांनी असे म्हटले आहे की तुम्ही निसर्गाच्या नियमांना बांधील राहून काही निर्माण केले तर निसर्ग ते टिकण्यास मदत करतो, परंतु तुम्ही निसर्गाला आव्हान देऊन काही निर्माण केले तर निसर्ग ते उद्ध्वस्त करण्याच्या उद्योगाला लागतो.

आजचे आधुनिक विज्ञान व प्राचीन भारतीय ग्रंथांमधून मांडण्यात आलेले विज्ञान यावर अनाठाई चर्चा करून लढा उभा करण्यापेक्षा भारतीय वेद ग्रंथातून मांडलेले विज्ञान, त्यातील अर्थासह समजून घेऊन मानवाच्या उन्नतीसाठी त्या ज्ञानाचा उपयोग करून घेणे, व्यवहारिक व प्रात्याक्षिक विज्ञानाची उभारणी करण्यासाठी प्रयत्न करणे हीच आपणा सर्वांची जबाबदारी आहे.

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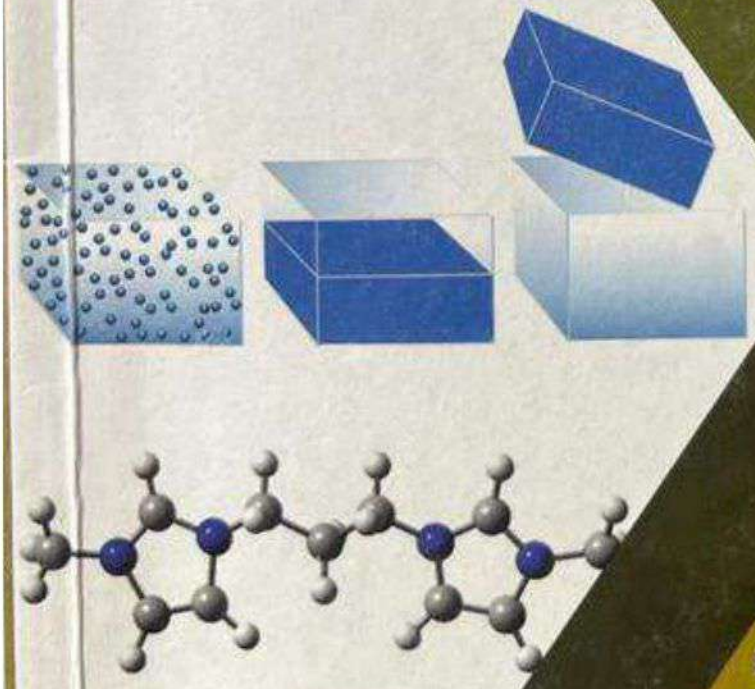

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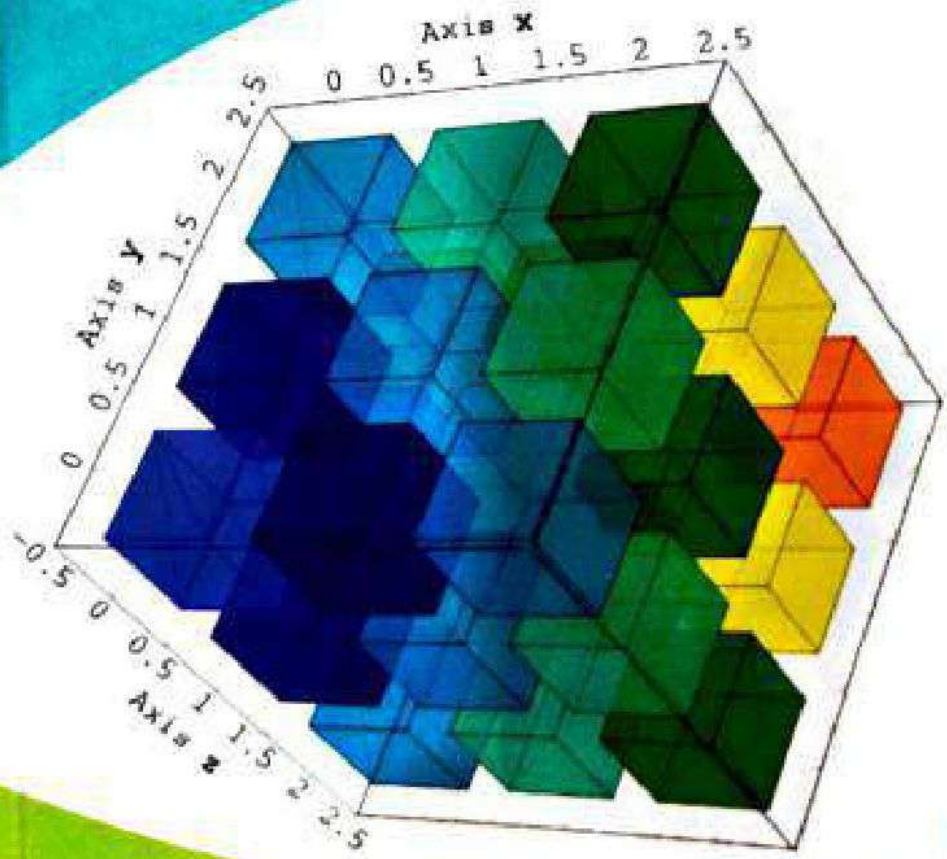

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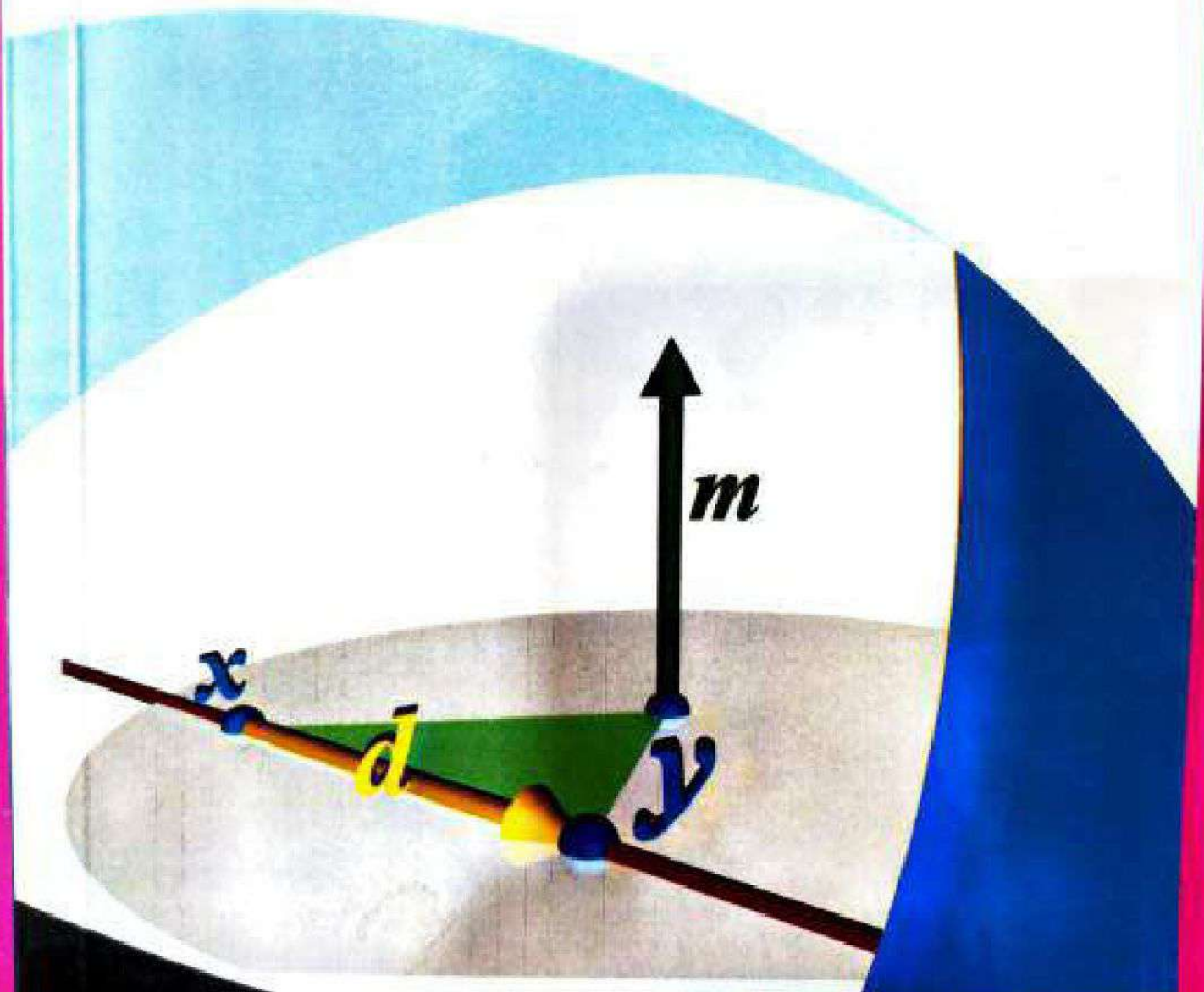

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Research Techniques in Science and Technology

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Abstract:
In this paper various techniques of research in Science and Technology are listed and briefly discussed. The paper is intended for students and research scholars of science subjects. Various stages of research are discussed in detail. Special care has been taken to motivate the young researchers to take up challenging problems. Before embarking on the details of research methodology and techniques, a brief overview of the research process has been taken.

Keywords: *Types of research, Research techniques, Research process*

1. Introduction:

Research may be very broadly defined as systematic gathering of data and information and its analysis for advancement of knowledge in any subject. It is also defined investigation or experimentation aimed at the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws".

Research is, thus, an original contribution to the existing stock of knowledge making for its advancement. It is the pursuit of truth with the help of study, observation, comparison and experiment. In short, the search for knowledge through objective and systematic method of finding solution to a problem is research. The systematic approach concerning generalization and the formulation of a theory is also research. As such the term 'research' refers to the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analyzing the facts and reaching certain conclusions either in the form of solutions(s) towards the concerned problem or in certain generalizations for some theoretical formulation.

Research is not confined to science and technology only. There are vast areas of research in other disciplines such as languages, literature, history and sociology. In this paper various techniques of research, research process, types of research and various stages of are searchin Science and Technology are focused.

2.Types of research:

Research is broadly classified into two main classes:

1. Fundamental or basic research
2. Applied research

- **Basic Research**

Basic research is an investigation on basic principles and reasons for occurrence of a particular event or process or phenomenon. It is also called theoretical research. Study or investigation of some natural phenomenon or relating to pure science is termed as basic research. The outcomes of basic research form the basis for many applied research. Researchers working on applied research have to make use of the outcomes of basic research and explore the utility of them. Research on improving a theory or a method is also referred as fundamental research.

For example, suppose a theory is applicable to a system provided the system satisfies certain specific conditions. Modifying the theory to apply it to a general situation is a basic research.

Fundamental research leads to a new theory or a new property of matter or even the existence of a new matter, the knowledge of which has not been known or reported earlier. For example, fundamental research on

- ❖ astronomy may leads to identification of new planets or stars in our galaxy,
- ❖ elementary particles results in identification of new particles,
- ❖ complex functions may leads to new patterns or new properties associated with them,
- ❖ differential equations results in new types of solutions or new properties of solutions

not known so far,

- ❖ chemical reactions leads to development of new compounds, new properties of chemicals, mechanism of chemicals reactions, etc.,
- ❖ medicinal chemistry leads to an understanding of physiological action of various chemicals and drugs,
- ❖ structure, contents and functioning of various parts of human body helps us identify

the basis for certain diseases.

- **Applied Research**

In an applied research one solves certain problems employing well known and accepted theories and principles. Most of the experimental research, case studies and inter-disciplinary research are essentially applied research. Applied research is helpful for basic research. A research, the outcome of which has immediate application is also termed as applied research.

Such a research is of practical use to current activity. Applied research is concerned with actual life research such as research on increasing efficiency of a machine, increasing gain factor of production of a material, pollution control, preparing vaccination for a disease, etc. Obviously, they have immediate potential applications.

Thus, the central aim of applied research is to find a solution for a practical problem which warrants solution for immediate use, whereas basic research is directed towards finding information that has broad base of applications and thus add new information to the already existing scientific knowledge.

Basic and applied researches are generally of two kinds: normal research and revolutionary research. It is also quantitative or qualitative or even both. Other types of research include action research. For discussion on these types of research see refs.[1-3].

3. Research Techniques:

Research methods or techniques, thus, refer to the methods the researchers use in performing research operations. In other words, all those methods which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research, particularly the applied research, it to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible.

Keeping this in view, research methods can be put into the following three groups:

1. In the first group we include those methods which are concerned with the collection of data. These methods will be used where the data already available are not sufficient to arrive at the required solution;
2. The second group consists of those statistical techniques which are used forest ablishing relationships between the data and the unknowns;
3. The third group consists of those methods which are used to evaluate the accuracy of the results obtained.

Research methods falling in the above stated last two groups are generally taken as the analytical tools of research. Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying howresearch is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them.

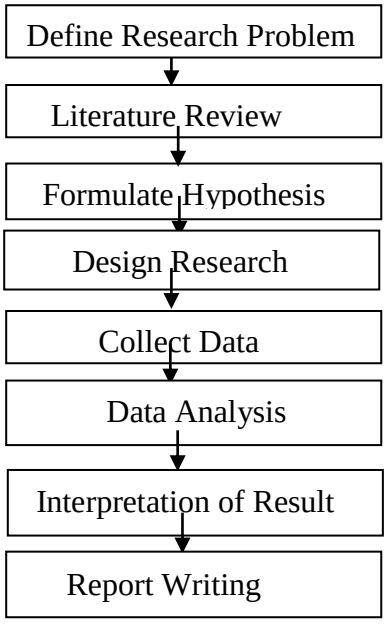
It is necessary for the researcher to know not only the research methods / techniques but also the methodology. Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or chi-square, how to apply particular research techniques, butthey also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why.

Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not.

All this means that it is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem. For example, an architect, who designs a building, has to consciously evaluate the basis of his decisions, i.e., he has to evaluate why and on what basis he selects particular size, number and location of doors, windows and ventilators, uses particular materials and not others and the like. Similarly, in research the scientist has to expose the research decisions to evaluation before they are implemented. He has to specify very clearly and precisely what decisions he selects and why he selects them so that they can be evaluated by others also. From what has been stated above, we can say that research methodology has many dimensions sand research methods do constitute apart of the research methodology. The scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others. Why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analyzing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.

4. Research process:

Research process consists of series of actions or steps necessary to effectively carry out research and the desired sequencing of these steps. The chart shown in Figure well illustrates a research process.



The chart indicates that the research process consists of a number of closely related activities. But such activities overlap continuously rather than following a strictly prescribed sequence. At times, the first step determines the nature of the last step to be undertaken. If subsequent procedures have not been taken into account in the early stages, serious difficulties may arise which may even prevent the completion of the study. One should remember that the various steps involved in a research process are not mutually exclusive; nor are they separate and distinct. They do not necessarily follow each other in any specific order and the researcher has to be constantly anticipating at each step in the research process the requirements of the subsequent steps. However, the above order concerning various steps provides a useful procedural guideline regarding the research process.

5. Conclusions: The researcher must rephrase the problem into a working proposition. Rephrasing the problem means putting the problem in specific terms that is feasible and may help in the development of working hypotheses. Once the researcher has gone through the above techniques systematically, it is easy to rephrase the problem into analytical and operational terms.

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Search, Research and Plagiarism

Dr.V. S. Patil
Smt. P. K. Kotecha Mahila Mahavidyala, Bhusawal

Abstract:
The world would have been in a stone age, if there had not been research. This development in every sphere of life is only due to research. Research is a systematic study with specific methodology. It is advanced process that starts from 'search'. Search is random process of identifying something non systematic manner. 'Search' and 'research' both are of equal importance. They depend on each other. Research leads to new and creative outcomes. It is a systematic invention. There are several types of research. In every research both basic and applied structural process is followed. Research includes observation, formation of topic, hypothesis, conceptual definition, operational definition, collection of data, analysis of data, interpretation of data, test, revising of hypothesis and conclusion. Plagiarism in research is major concern today. Plagiarism is borrowing the ideas without acknowledging them. The effects of plagiarism can be at personal, professional, ethical and legal level. Now a days latest software's are available to find out plagiarism.

Key words: *Research, specific methodology, non systematic manner, applied structural process, hypothesis, and plagiarism etc.*

Introduction:

Research means searching again to inquire carefully and thoroughly into some matter that concern us. The main goal of research is to uncover new information, update current knowledge or to determine facts from whatever is believed to be truth. Where search come to its dead end, there begin research. Where research comes to its dead end, there is a fall. Taller today we remember, once upon a time Kodak, Nokia, HMT, Ambassador had their monopoly in the market. Due to negligence towards 'research', today they are about to disappear from user world. The world would have been in a stone age, if there had not been research. This development in every sphere of life is only due to research. Research is mostly used to improve the world. It is the systematic foundation through which new knowledge is attained. Existing. Knowledge is improved and new techniques and processes are developed. Search on the other hand is a random process of identifying something in a non systematic manner. It is taken as a casual task where no methodology is followed. But both search and research are of equal importance. They depend on each other. Research requires some basic search. Searching is the preliminary process where research is searching systematically in depth. Research brings about innovation and innovation adds more information to the original. Research undertaken with positive and humanitarian approach, help to add more beauty to the world.COVID-19 would have been threat to mankind, if there had not been vaccines. COVISHIELD, COVAXIN, FYZER, SPUTNIK are the gift of research due to which we are safe and secure. That research is boon, which save lives.

Research:

Research is defined as the creation of new knowledge or the use of existing knowledge in a new and creative way so as to generate new concepts, methodologies and understandings. Research leads to new and creative outcomes. It is the systematic investigation into. It is the study of materials and sources in order to establish facts and reach new conclusions. Research is creative and systematic work undertaken to increase the stock of knowledge. It involves the collection, organization and analysis of information to increase understanding of a topic or issue. A research project may be an expansion of the past work. There are several types of research. These may be scientific, humanities, artistic, economic, social, business, marketing practitioner research, life, technological etc. Research has been defined by a number of ways but no of the definition is all en-compassing. In every research in both basic and applied a certain structural process is to be followed. It includes -observation and formation of the topic, hypothesis, conceptual definition, operational definition, gathering of data, analysis of data, data interpretation, test, revising of hypothesis and conclusion. According to the goal of research, there are three types of research methods. These are -exploratory research, constructive research, and empirical research. Again there are two main major types of empirical research. These are Qualitative research and Quantitative research.

Plagairism in Research :

Plagiarism as a noun is the practice of taking someone else's work or ideas and passing them off as one's own with or without their consent by incorporating it into your work without acknowledgement. All published or unpublished material, whether in manuscript, printed or electronic form is covered under this definition. According to Cambridge dictionary, plagiarism is the process or practice of using another person's ideas or work and pretending that it is your own.

According to M.P.Sinha," plagiarism is borrowing the ideas of others without acknowledging them. If a student incorporates a few lines of writer and doesn't acknowledge him, he commits plagiarism. Even when he paraphrases the ideas of others, he can be charged with plagiarism". Plagiarism is temptation for all. Every researcher attempts to show his talent and novelty to others. Consciously or unconsciously he borrows the concepts of others and claims to be his own. He does it purposely because he wants to hide drawbacks. It may be because of his laziness and ignorance. It makes him to copy passages from other sources. He neglates to acknowledge the name, and the work of original author and his work. Sometimes the researcher is not able to paraphrase the original content. In such a situation he just keeps on copying the passages from original text. It then lands him in trouble.

The Effect of Plagiarism :

The effects of plagiarism can be at different level. It can be on personal, professional, ethical and legal too. Now a days softwares are available to find out plagiarism. So plagiarists are caught red hand in short span of time. Once if researcher is blamed of plagiarism, he feels insulated .He loses his reputation. He is

looked upon with suspicion. Generally educationists, teachers, students, journalist, authors are the victims of plagiarism. Effects Of plagiarism include -

a - Loss of reputation

b - Legal repercussions

c - Monetary repercussions

Apart from these, there might be other consequences. They are far reaching. No one is excused from ethical and legal allegations. Therefore, before starting to write any project or thesis, the researcher must know about serious consciousness of plagiarism. The rules regarding plagiarism are simple and easy to understand. Now a days online checker are very easily available. Laziness or negligence towards plagiarism can result in bad reputation, termination of the job or some legal issues. It may be research paper, M.Phil thesis or doctoral dissertation or project; these are all by all means product of research. These need same kind of effort, hard work and sincerity. Honesty is the key point. So every researcher should keep himself at arm's length from plagiarism.

Conclusion:

There is always difference between search and research. Search is a general term where as research is a systematic investigation for the purpose of gaining new knowledge. It is careful study or scientific enquiry. Research has its own methodology. It is discovery of new facts. Research methods vary as per the issue. Careful documentation, Analysis of the data interpretation citations are elements in research.

Research is an innovation. It should be always undertaken for the good of mankind. Research is a continuous process. It should be perused with patience, sincerity, hard work and honesty. Every researcher should keep himself away from any kind of plagiarism. Plagiarism can cause loss to the researcher on his personal, social and ethical level.

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Plagiarism : Issues and Concern

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Abstract

Ethics is the branch of philosophy that involves systematising, defending and recommending concept of right and wrong. Research ethics provides guideline for responsible conduct of research. Every researcher, student and academician should adopt the ethics in their research work. But some of them steal the ideas and thoughts of others. It's called "Plagiarism". Plagiarism means to steal and pass off the ideas or words of another as one's own. The author uses another's production without crediting the source and present as new and original an idea or product derived from an existing source. In other words, plagiarism is an act of fraud. It involves both stealing someone else's work and lying about it afterward.The expression of original ideas is considered intellectual property and is protected by copyright laws, just like original inventions. By ethical point of view, if you are taking some ideas, thoughts or expressions from another original author then you must give credit to him. There are some common reasons of plagiarism and different types also. You can avoid plagiarism by giving attribution and citation. Credit the original author by citing the full references and cite the source of information in the bibliography of reference section. Otherwise, plagiarism would lead to payment of a huge fine or imprisonment.

Key words –*Research, Research Ethics, Plagiarism etc.*

Objectives of the study-

1) To understand the conceptual framework of Plagiarism.
2) To study the research ethics.
3) To study plagiarism issues.

Methodology- The paper is based on secondary data. The study is not more descriptive in nature. Information has been collected from various website. The information on internet have been studied.

Introduction

Research is defined as careful consideration of study regarding a particular concern or problem using scientific methods. According to the American sociologist Earl Robert Babbie, "research is a systematic inquiry to describe, explain, predict, and control the observed phenomenon. It involves inductive and deductive

methods." Good research follows a systematic approach to capture accurate data. Researchers need to practice ethics and a code of conduct while making observations or drawing conclusions.

Plagiarism is derived from Latin word "*plagiarius*" which means stealing someone else's creative work .The word plagiarism entered the Oxford English dictionary in 1621. Plagiarism has been defined by the Encyclopedia Britannica as "the act of taking the writings of another person and passing them off as one's own." It is an act of forgery, piracy, and fraud and is stated to be a serious crime of academia. It is also a violation of copyright laws. Honesty in scientific practice and in publication is necessary. The World Association of Medical Editors (WAME) defines plagiarism as "the use of others published and unpublished ideas or words or other intellectual property without attribution or permission and presenting them as new and original rather than derived from an existing source."

In 1999, the Committee on Publication Ethics (COPE) defined plagiarism as "Plagiarism ranges from the unreferenced use of others published and unpublished ideas including research grant applications to submission under new authorship of a complex paper, sometimes in a different language. It may occur at any stage of planning, research, writing or publication; it applies to print and electronic versions."

Plagiarism is the representation of another author's language, thoughts, ideas, or expressions as one's own original work. Although plagiarism in some contexts is considered theft or stealing, the concept does not exist in a legal sense, although the use of someone else's work in order to gain academic credit may meet some legal definitions of fraud. "Plagiarism" specifically is not mentioned in any current statute, either criminal or civil. Some cases may be treated as unfair competition or a violation of the doctrine of moral rights. If you are taking some ideas, thoughts or expressions from another original author then you must give credit to him.

There are some reasons for rejecting a research paper by the journal or editor as follows.

1. **Spelling and grammatical errors:** Incorrect usage of English words, for example, 'a', 'an' and 'the' must be used correctly and all the sentences must be grammatically correct. You must aware about spellings. Use spell check facility while typing the paper. Here, you can take the help of your colleague having expertise in English.
2. **Suitability of research paper:** The manuscript to be submitted must match with the aims and scopes of the research journal where it will be submitted. Subject of research paper should be suitable to the theme of research journal.
3. **Following the guidelines of journals:** Every journal has given certain guidelines that are how to prepare a manuscript like how to insert figures, tables, etc, and what should be spacing and font size. The paper must be written as per the guidelines of the journal.

4. **Abstract:** An abstract summarises usually in one paragraph of 150/250/300/500 words. The abstract should not contain lengthy background information. Don't use abbreviations. If word limit is declared by the editor of journal, then researcher should submit the abstract in that limit. Otherwise, paper will be rejected.
5. **Length of research paper:** Just like word limit of abstract, editor may give word limit for research paper. You must write the paper as per the guidelines about length of research paper.
6. **Bibliography and Citation:** Many research papers are rejected only because authors or researchers have not prepared bibliography systematically and scientifically. The references must be written as per the guidelines of the journal. The basic old references may be there but the paper must contain most of the latest research as references. You have to give the citation to your work.
7. **Plagiarism:** One of the major reasons for not acceptance of research paper is plagiarism. Plagiarism simply means a copy or using someone's else work. This is the utmost priority of a good researcher and proper care must be taken about plagiarism while writing a paper.

Research Ethics

Ethics are the moral principles that govern a person's behaviour. Research ethics may Ethics are the moral principles that govern a person's behavior. Research ethics maybe referred to as doing what is morally and legally right in research. They are actually

norms for conduct that distinguish between right and wrong and acceptable and unacceptable behaviour. Research ethics are the set of ethical guidelines that guides us on how scientific research should be conducted and disseminated. Research ethics govern the standards of conduct for scientific researchers. It is the guideline for responsibly conducting the research.

Forms of Academic Plagiarism

Different classifications of academic plagiarism forms have been proposed. Many classifications follow a behavioural approach. Following are the 10 main forms of plagiarism.

- Submitting someone's work as their own.
- Taking passages from their own previous work without adding citations.
- Re-writing someone's work without properly citing sources.
- Using quotations but not citing the source.
- Interweaving various sources together in the work without citing.
- Citing some, but not all, passages not citing.

- Melding together cited and uncited sections of the piece.
- Providing proper citations, but failing to change the structure and wording of the borrowed ideas enough.
- Inaccurately citing a source.
- Relying too heavily on other people's work, failing to bring original thought into the text.

Types of Plagiarism -There are several types of plagiarism. In this article, we will get to know the common types as under.

- **Complete Plagiarism:** Complete Plagiarism is the most extreme form of plagiarism. In this plagiarism, a person completely copies someone else's work such as a research paper, article, image, etc, and represents it as their own work. This form of plagiarism is similar to identity theft or stealing.
- **Verbatim:** Verbatim is also known as direct plagiarism. When we read a book, we must have observed that if any statement that a famous person has made is always represented in double quotations and is highlighted so that we get to know that it is said by this particular person. Similarly consider a person writing an article and mentioning someone's else work or words that too exactly the same. But this person doesn't represent it in quotation marks. Then that person is said to be exhibiting direct plagiarism. Hence copying another person's work word to word and not representing it in quotation marks is known as Verbatim or direct plagiarism.
- **Self-Plagiarism:** This kind of plagiarism is the duplication of a person's own work. It is also known as auto plagiarism. It occurs when a person copies some words of his own published work and uses the same for another work. This form of plagiarism is commonly observed in research journals. Researchers may make re-use of their research work for another research work. However, the percentage of re-usage must be according to those set by the publishing journals if they allow them to do so.
- **Source-Based Plagiarism:** This form of plagiarism is most commonly observed in research work. In the research paper one needs to provide references that have contributed to their work. If a person provides wrong references that do not exist, or that are not relating to the work then it is known as source-based plagiarism. The falsification of data or its fabrication is also source-based plagiarism. Falsification and fabrication of data are manipulating or representing false or non-existing data.
- **Accidental Plagiarism:** This kind of plagiarism mostly occurs due to a lack of knowledge. If we don't know how to paraphrase, cite and quote a

research work we leave the work as it is and it results in accidental plagiarism.

Why is plagiarism unethical?

- Plagiarism is unethical because we are representing someone's other work as our own without giving them the credit. In the real world if someone else takes our things without our permission then we call that person a "thief" and doing so is considered as a punishable offence. Similarly, if in the virtual world someone copies someone else's work it is unethical and is a punishable offense.
- Plagiarism affects the integrity of academics. Researchers are given the degree of Ph.D. on basis of their research works. Students are given grades according to their homework. If we will be practicing plagiarism, we will not be gaining any knowledge. We may even succeed in getting our Ph.D. degree or good grades but that will put our career at risk and is a threat to our future. We will be a risk for society, organizations where we may work as we do not have the complete knowledge of the corresponding work. So, it's unethical.
- If we use the plagiarized content for our personal benefits such as monetary gains, fame, etc. then it is unethical because we are being benefitted for what we actually have not done. We are being rewarded without actually performing well or giving our 100 percent to get that reward. It is immoral to do so.

Laws against Plagiarism

There are many laws against plagiarism. Some of them are mentioned below-

- In section 57 of the Indian Copyright Act 1957, authors have "the right to claim authorship of their works among other things. It grants the authors the special right to be attributed for their work. The statute recognizes the right to attribution analogous to the rights not to be plagiarized."
- In section 63 of the Indian Copyright Act 1957, "a convicted infringer is liable to be imprisoned between six months to three years, and to be fined between fifty thousand and two lakh rupees".
- University Grants Commission (UGC) has provided a certain set of guidelines that need to be followed by universities in order to prevent plagiarism in academic activities.

Common reasons of Plagiarism

1. **Academic pressure** - Stress is a reason why many writers plagiarize accidentally. Sometimes they are so stressed out that they forget to include proper citations and references or even repeat themselves, including

fragments from their previous works.In academic environments, this pressure is especially understandable.

2. **Lack of writing skill**–This is one most of the reasons of plagiarismi. e. lack of writing skill. The writers or researchers might experiment with switching out a few synonyms or just paste the passage into their document. Even they do not care about task at hand or are otherwise not motivated to complete it.
3. **Fear of failure** - Researchers may fear of failure or fear to taking risks in their own work.So they tend to make plagiarism.
4. **Time management** - Researchers may have poor time-management skills or they may plan poorly for the time and effort required for research-based writing, and believe they have no choice but to plagiarize. Through poor time management or lack of focus, they might find themselves in a situation where they don't have enough time to finish a task.
5. **Ignorance of citation rules** -This one is a difficult for educators and editors alike but some writers simply do not care about the rules of citation. They completely ignore the citation rules.
6. **Internet accessibility -** Internet access is the ability of individuals and organizations to connect to the internet using computer terminals and other devices and to access services such as email and the World Wide Web**.** The Internet offers an opportunity for inclusiveness to view the global community of its users as one while recognizing its rich diversity**.** Researcher can retrieve a lot of information from the websites.
7. Instructors and institutions may fail to report cheating when it does occur or may not enforce appropriate penalties.
8. **Lack of confidence -** Of all of the reasons for committing plagiarism, this one seems to come up the most consistently, especially in academic environment. When a writer doesn't feel as if they are up to the task they are given, they are often tempted to steal. Typically, they take from those they idolize or see as more talented.

Plagiarism Issues

Although you did not intend to present a plagiarized paper but once your paper containing the plagiarized material comes in to the limelight there would be strict action taken against you. You will be given a punishment as harsh as suspension from your respective agency.

i) Plagiarism is becoming a serious issue as the sources from where the papers are copied from the portals of major organizations and multinational industries. If such a huge organization is making such a lot of effort to write on their subjects and publish them on an internet

website then how can anyone else have the right to claim them as his/ her own.At that time plagiarism would lead to payment of a huge fine or imprisonment.

ii) Where research degree examiners suspect that a thesis contains minor plagiarism, this will be explored with the student during the viva. However, where research degree examiners suspect that a thesis contains major plagiarism, the viva will be postponed until an investigation under the Procedures for the Investigation of Research Misconduct is concluded. The outcome of that investigation will determine the next steps for the student.

iii) Plagiarism is a serious breach of research ethics that, if committed intentionally, is considered research misconduct. Plagiarism may result in serious sanctions, including public disclosure, loss of research funding, loss of professional stature and termination of employment. Plagiarism undermines the authenticity of research manuscripts and the journals in which they are published and compromises the integrity of the scientific process and the public regard for science. Plagiarism violates the literary rights of individuals who are plagiarized and the property rights of copyright holders. Violation of literary or property rights may result in legal action against the individual(s) committing plagiarism. Although plagiarism has existed since the beginning of science, it seems to be increasing because the World Wide Web (Internet) facilitates finding and copying the work of others.

Plagiarism Detection Tools

Modern technology and the development of internet have given us access to lot of information any time we desire it and from any place. Following are the free plagiarism detection tools that will allow e- learning professionals to tackle the plagiarism problem.

1. Duple Checker
2. Paper Rater
3. Plagiarism Checker
4. Plag Scan
5. Plagiarism hunt
6. Copyleaks
7. Plagiarisms
8. Platinum
9. Plag Tracker
10. Quetext

Conclusion:

Plagiarism is a major problem for research. It is a well-known and growing issue in the academic world.Plagiarism means stealing the originality of another writer. It is considered a serious violation of ethics in academics.Plagiarism should be understood as “using someone else’s intellectual product (such as texts, ideas, or

results), thereby implying that it is their own". Plagiarism may be done intentionally or unintentionally. Intentional plagiarism involves dishonesty.If you use the words, ideas, or phrasing of another person or from published material, you must use quotation marks around the words and cite the source, or paraphrase or summarize acceptably and cite the source. It's the duty of the researcher to ensure that research is conducted in an ethical and responsible manner from planning to publication. Before publish the research paper, we can easily detect the plagiarism from the research work by using free plagiarism detection tools.

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Exploring Research Methodology

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Abstract

Research methodology is a way to solve the research problem systematically. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology. Researchers not only need to know how to develop certain indices or tests, how to calculate the mean, the mode, the median or the standard deviation or , how to apply particular research techniques, but they also need to know which of these methods or techniques, are relevant and which are not, and what would they mean and indicate and why. Researchers also need to understand the assumptions underlying various techniques and they need to know the criteria by which they can decide that certain techniques and procedures will be applicable to certain problems and others will not. All this means that it is necessary for the researcher to design his methodology for his problem as the same may differ from problem to problem.

Keywords: *Research, Methodology, Research Methodology, Research Techniques, Qualitative research, Quantitative Research*

Introduction

Research in common parlance refers to a search for knowledge. Once can also define research as a scientific and systematic search for pertinent information on a specific topic. In fact, research is an art of scientific investigation. The Advanced Learner"s Dictionary of Current English lays down the meaning of research as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge." [1] Redman and Mory define research as a "systematized effort to gain new knowledge." [2]

Methodology is the systematic, theoretical analysis of the methods applied to a field of study. It comprises the theoretical analysis of the body of methods and principles associated with a branch of knowledge. Typically, it encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques. [3]

Research Methodology is science of studying how research is done scientifically. A way to systematically solve the research problem by logically

adopting various steps. Methodology helps to understand not only the products of scientific inquiry but the process itself. Research Methodology aims to describe and analyze methods, throw light on their limitations and resources, clarify their limitations and resources, clarify their presuppositions and consequences, relating their potentialities to the twilight zone at the „frontiers of knowledge". [4]

Objectives of Research

The purpose of research is to discover answers to questions through the application of scientific procedures. The main aim of research is to find out the truth which is hidden and which has not been discovered as yet. Though each research study has its own specific purpose, we may think of research objectives as falling into a number of following broad groupings:

1. To gain familiarity with a phenomenon or to achieve new insights into it (studies with this object in view are termed as exploratory or formulative research studies);
1. To portray accurately the characteristics of a particular individual, situation or a group (studies with this object in view are known as descriptive research studies);
2. To determine the frequency with which something occurs or with which it is associated with
3. something else (studies with this object in view are known as diagnostic research studies);
4. To test a hypothesis of a causal relationship between variables (such studies are known as hypothesis-testing research studies). [5]

Types of Research

Research can be classified on the basis of time, purpose, settings, place and technique. Some researches have similarities and some have little variations. But all the types of research have its own significance.

Basic Research : It is also called as pure research. Research for the sake of enhancement of knowledge is termed as Basic Research. It is done with the intention of overpowering of the unknown facts. It is concerned with the generalizations and also with the formulation of new theory. Basic research may not produce solutions or results to the present problem but it contributes something to the scientific knowledge. Though its work may have zero importance, but it may become useful in the future.

Applied Research : It is also called as practical research or „need based" research. The main intention is to find solutions to the current problems being faced by an institution, society, business or in government offices. Research to identify social, political and economic changes, which has adverse effects in different sectors are

some of the examples of applied research. This type of research is mainly carried on with the secondary data.

Empirical Research : It is often referred to as experimental research. In this primary data is collected, analyzed, interpretation is done and subjected to hypothesis testing. Researcher should develop his experimental designs and should provide working hypothesis before the commencement of his research for good output.

Qualitative Research : As the name itself suggests, this research is concerned with the qualitative process. It generally works with the study of human behavior. By this research one can find the body language, attitude, opinions, feelings etc. from the opposite person through observation. It is mainly helpful for Psychiatrists and interviewers. Many techniques are being used like word association test, sentence completion, drawing pictures, Thematic Apperception Test. It is needed in times where quantitative research does not work. Hence, it is also called as „Motivation Research".

Quantitative Research : This research is mainly concerned with the measurement of phenomenon in terms of quantity. Many a times a debate is conducted between qualitative and quantitative terms. An example for the quantitative research is carrying out senses for collecting population, social, economic statistics of a particular area. They are subjected to statistical analysis. It relays mainly on primary data like survey method and questionnaire method. However, one can observe the inter-dependence between one another.

Descriptive Research : As the name itself indicates, this research directly deals with description. It includes different data collection like survey method and fact finding techniques. The main character of this research is that, the researcher does not have control over the variables. He should describe what has happened and what is happening. Most Ex post facto projects use descriptive research.

Some other types of research: Apart from the above types of research, there are many other classifications like Longitudinal Research which is spread over for a long period of time. In this change takes place gradually.

Historical Research which is concerned with the collecting of auto biographies, letters, documents, enquiries for knowing the past.

Simulation Research deals with the creation of an artificial environment which is quite similar to real environment. Depending upon the need of the situation we can create and adjust to it. [6]

Significance of Research

- It helps in framing of policies: Research helps in the framing of various government policies. Nearly all the government policies and budgets are planned and executed through research with the help of researcher. Annual budget, monthly

budget, monetary and economic policies are all framed by the government. The government is assisted by various organizations for framing the policies through research.

- Basic aim is to gain knowledge : It leads to many ideas and changes old facts.
- It is used in business organization: Many business companies hire researcher to work on various things. It is used in studying the changes taking place in the market. It helps in capital budgeting, tax management and cost saving policies.
- It leads to discovery and innovation of unknown facts and unexplored theories. It leads to the growth of the society and its citizens. It gives chance to the researcher to go deep into the subject and to innovate it.
- It avoids superstitious beliefs, myths and prejudices: Many people are still not aware of the research activities and its importance. Many ancient beliefs and myths have been proven wrong with the help of research.
- It leads to development of social welfare and society.
- It is useful for PhD students to write their thesis.

Thus, Research is a fountain of knowledge, which helps in solving all government policies, business problems, avoids superstitious beliefs and helps in the development and maturity of society and its citizens. [6]

Research Process:

1. Formulating the research problem : There are two types of research problems, viz., those which relate to states of nature and those which relate to relationships between variables. At the very outset the researcher must single out the problem he wants to study, i.e., he must decide the general area of interest or aspect of a subject-matter that he would like to inquire into. Initially the problem may be stated in a broad general way and then the ambiguities, if any, relating to the problem be resolved. Then, the feasibility of a particular solution has to be considered before a working formulation of the problem can be set up. The formulation of a general topic into a specific research problem, thus, constitutes the first step in a scientific enquiry. Essentially two steps are involved in formulating the research problem, viz., understanding the problem thoroughly, and rephrasing the same into meaningful terms from an analytical point of view.

2. Extensive literature survey : Once the problem is formulated, a brief summary of it should be written down. It is compulsory for a research worker writing a thesis for a Ph.D. degree to write a synopsis of the topic and submit it to the necessary Committee or the Research Board for approval. At this juncture the researcher should undertake extensive literature survey connected with the problem. For this purpose, the abstracting and indexing journals and published or unpublished bibliographies are the first place to go to. Academic journals, conference proceedings, government reports, books etc., must be tapped depending on the

nature of the problem. In this process, it should be remembered that one source will lead to another. The earlier studies, if any, which are similar to the study in hand should be carefully studied. A good library will be a great help to the researcher at this stage. [5]

3. Developing a working hypothesis : A research in any field of study do not give proper results unless and until we develop a working hypothesis. It is a tentative statement or assumption regarding the solution to the problem of study. It is an assumption which is used to draw the logical consequences. It is the key point of study and hence it should be limited and should contain much knowledge. It is helpful for researcher for predictions and also maintains complete focus on the study. It should be precise and clearly defined. It gives an idea of the type of data to be used and type of method or techniques for the study. In some research activities like exploratory or formative, hypothesis is not used for testing. [6]

4. Preparing the research design : The research problem having been formulated in clear cut terms, the researcher will be required to prepare a research design, i.e., he will have to state the conceptual structure within which research would be conducted. The preparation of such a design facilitates research to be as efficient as possible yielding maximal information. In other words, the function of research design is to provide for the collection of relevant evidence with minimal expenditure of effort, time and money. But how all these can be achieved depends mainly on the research purpose. Research purposes may be grouped into four categories, viz., (i) Exploration, (ii) Description, (iii) Diagnosis, and (iv) Experimentation. A flexible research design which provides opportunity for considering many different aspects of a problem is considered appropriate if the purpose of the research study is that of exploration. But when the purpose happens to be an accurate description of a situation or of an association between variables, the suitable design will be one that minimizes bias and maximizes the reliability of the data collected and analysed. There are several research designs, such as, experimental and no experimental hypothesis testing. Experimental designs can be either informal designs (such as before-and after without control, after-only with control, before-and-after with control) or formal designs (such as completely randomized design, randomized block design, Latin square design, simple and complex factorial designs), out of which the researcher must select one for his own project. The preparation of the research design, appropriate for a particular research problem, involves usually the consideration of the following: (i) the means of obtaining the information; (ii) the availability and skills of the researcher and his staff (if any); (iii) explanation of the way in which selected means of obtaining information will be organized and the reasoning leading to the selection; (iv) the time available for research; and (v) the cost factor relating to research, i.e., the finance available for the purpose. [5]

5. Determining sample design : The researcher must decide the way of selecting a sample or what is popularly known as the sample design. In other words, a sample design is a definite plan determined before any data are actually collected for obtaining a sample from a given population. A brief mention of the important sample designs is as follows:

- Deliberate sampling
- Simple random sampling Systematic sampling
- Stratified sampling
- Quota sampling
- Cluster sampling and area sampling
- Multi-stage sampling
- Sequential sampling [5]

6. Collecting the data : The method of gathering or collecting the data is planned in data collection design. There are many types for collecting the data. The two types of collecting data are Primary data and Secondary data. Some of the important methods for collecting the Primary data are as follows:

Questionnaire: The method of collecting data in vast geographical areas is done through Questionnaire method. Hence questionnaires are mailed to the research areas and they are distributed among the respondents. It is a time saving and economical method but the main drawback is that the answers given by the respondents are not accurate.

Interview : The investigators prepare a set of questions and ask them in a serial vise to the respondents. There are different types of interview like personal, group, mock and telephone interview. It is fast procedure. We can get extra information which is related to the topic. But it is costly. Some respondents may try to hide some answers. It saves much time of the investigator.

Observation: This is also one type of collecting data primarily. In this researcher observes the day to day process of the society or a single person. Sometimes researcher has to involve in the process. It discovers the human behaviour of the respondent. No doubt this method is cost effective but the data collected is also limited. It can't predicts the happenings of the future.

Secondary data can be collected through books, published articles, internet and syndicate services. Syndicate services are companies which collect and sell data to various people who are in need. It is suitable for researcher who wants to survey on large population. The disadvantage of this methods that the researcher will not enjoy extra information and it is very costly.

Though the data can be collected in a short span of time but the accuracy cannot be stated. [6]

7. Execution of the project : After preparing a good design for the process of research, the researcher should move on to the next step of execution. From this stage the researcher starts executing the research design. Training should be given to the surveyors and a working manual should be given to them. The collection of data should be carefully handled. [6]

8. Analysis of data: Soon after the collection of data, the researcher turns to the process of analysing the collected data. The raw data will be tuned. There are many things used for analysis like coding, tabulation, editing and statistical analysis. Data will be collected in the form of questionnaires or schedules. Hence the data collected in short forms will be elaborated through coding. Editing can be done at the time of collecting or collecting the data. Through editing the researcher removes all the mistakes in the project. It will be polished. Through tabulation the researchers do the work of preparing the tables.

9. Hypothesis-testing: After analysing the data as stated above, the researcher is in a position to test the hypotheses, if any, he had formulated earlier. Do the facts support the hypotheses or they happen to be contrary? This is the usual question which should be answered while testing hypotheses. Various tests, such as Chi square test, t-test, F-test, have been developed by statisticians for the purpose. The hypotheses may be tested through the use of one or more of such tests, depending upon the nature and object of research inquiry. Hypothesis testing will result in either accepting the hypothesis or in rejecting it. If the researcher had no hypotheses to start with, generalisations established on the basis of data may be stated as hypotheses to be tested by subsequent researches in times to come.

10. Generalizations and interpretation: If a hypothesis is tested and upheld several times, it may be possible for the researcher to arrive at generalization, i.e., to build a theory. As a matter of fact, the real value of research lies in its ability to arrive at certain generalizations. If the researcher had no hypothesis to start with, he might seek to explain his findings on the basis of some theory. It is known as interpretation. The process of interpretation may quite often trigger off new questions which in turn may lead to further researches.

11. Preparation of the report or the thesis: Finally, the researcher has to prepare the report of what has been done by him. Writing of report must be done with great care keeping in view the following: 1. The layout of the report should be as follows: (i) the preliminary pages; (ii) the main text, and (iii) the end matter. In its preliminary pages the report should carry title and date followed by acknowledgements and foreword. Then there should be a table of contents followed by a list of tables and list of graphs and charts, if any, given in the report. The main text of the report should have the following parts: (a) Introduction: It should contain a clear statement of the objective of the research and an explanation of the

methodology adopted in accomplishing the research. The scope of the study along with various limitations should as well be stated in this part. (b) Summary of findings: After introduction there would appear a statement of findings and recommendations in non-technical language. If the findings are extensive, they should be summarised. (c) Main report: The main body of the report should be presented in logical sequence and broken-down into readily identifiable sections. (d) Conclusion: Towards the end of the main text, researcher should again put down the results of his research clearly and precisely. In fact, it is the final summing up.

Research Approach

Research approach can be divided into three types:

1. Deductive Research approach
2. Inductive Research approach
3. Abdicative Research approach

The relevance of hypotheses to the study is the main distinctive point between deductive and inductive approaches. Deductive approach tests the validity of assumptions (or theories/hypotheses) in hand, whereas inductive approach contributes to the emergence of new theories and generalizations. Abductive research, on the other hand, starts with „surprising facts" or „puzzles" and the research process is devoted their explanation. [7]

In Deductive Research Approach if you have formulated a set of hypotheses for your dissertation that need to be confirmed or rejected during the research process you would be following a deductive approach. Alternatively, inductive approach does not involve formulation of hypotheses. It starts with research questions and aims and objectives that need to be achieved during the research process. In abductive approach, the research process is devoted to explanation of „incomplete observations", „surprising facts" or „puzzles" specified. [7]

Major Changes in Research Environment

- Information Technologies in Research: The continued exponential rise in the power of information and computing technologies has had a dramatic impact on research across many disciplines. These technologies have not only increased the speed and scope of research but have made it possible to conduct investigations that were not possible before. Information technology advances have enabled new forms of inquiry such as those based on numerical simulation of physical and biological systems and the analysis of massive datasets to detect and assess the nature of relationships that otherwise would go unseen.
- The Globalization of Research: Because knowledge passes freely across national borders, scientific research has always been an international endeavor. But this internationalization has intensified over the past two decades. Nations have realized that they cannot expect to benefit from the global research enterprise without

national research systems that can absorb and build on that knowledge. As a result, they have incorporated science and technology into national plans and have established goals for increased R&D investments.

- Relevance of Research Results to Policy and Political Debates: Research also comes into play in debates and decisions over numerous contentious policy issues. Science is not the only factor in these discussions. Many considerations outside of science influence policy choices, such as personal and political beliefs, lessons from experience, trial-and-error learning, and reasoning by analogy. To contribute to public policy decisions, researchers must be able to separate their expertise as scientists from their views as advocates for particular public policy positions. [8]

Criteria of Good Research

Whatever may be the types of research works and studies, one thing that is important is that they all meet on the common ground of scientific method employed by them. One expects scientific research to satisfy the following criteria:

1. The purpose of the research should be clearly defined and common concepts be used.
2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained.
3. The procedural design of the research should be carefully planned to yield results that are as objective as possible.
4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings.
5. The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully.
6. Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis. 7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity. [5]

Conclusion

Research is a voyage of discovery; a journey; an attitude; an experience; a method of critical thinking; an activity caused by instinct of inquisitiveness to gain fresh insight/find answers to question/acquire knowledge.

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Contribution of Undergraduate Research in Higher Education

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Abstract

This is an overview of contribution of undergraduate (UG) research as a measure of reforms and development in the society. This article attempts a brief review about the efforts taken by government to improve higher education research, and underlines the limitations of their scope as well as their effects. The empirical and qualitative discussions and studies, shows the benefits and impacts of undergraduate research for the development of qualitative building of character and personality of students. It also shows effect on higher education institutions. Finally, this article also recommends ways of inducting this concept of research at under graduate level in the present system of education in India, based on basic concepts of New Education Policy 2020 (NEP 2020) and prescriptions by the Council on Undergraduate Research.

Keywords: *Research, under-graduate research etc.*

1. Introduction:

During COVID 19 pandemic, past one year all over, the world has been focused on vaccine research. In India the research scenario, in general, dose not present a bright picture. Which leads the thinkers for looking towards the research, development, innovations and teaching in India. It is observed that students graduating from the university and all higher education institutes have passed out without producing any original research [1]. Many of these graduates are not able to acquire the skills required for job opportunities and knowledge of industrial sector where they were to work in [2]. The main reason behind this is status-quo situation maintained in India`s educational system over the last few decades [3]. The system has not only failed to improve this situation but suffered tremendously and for this reason the blame can be placed on both the government and the educators. In the current scenario, segregation of teaching and research in the country indicates that entire generation of students graduated from the university system without producing any single research [1]. Many of these graduates are not able to acquire the skills required to get employed, even though they don`t have thorough knowledge of industry, they were to work in. hence some major changes

are suggested in New Education Policy 2020 for Higher education [4]. During COVID-19 pandemic, all over the world scientists, researchers were busy with research on COVID-19 vaccine. The research scenario in general in our country does not presents a bright picture. As per the bureau of Times of India (Feb 15 2021), in India there were only 253 researchers per million population of India and the country`s investment in research is not even 0.62 % of GDP. These numbers are well below global practices.

There are 1043 Universities, 42343 Colleges and 11779 Stand Alone Institutions listed on AISHE web portal. There are 522 General, 177 Technical, 63 Agriculture & Allied, 66 Medical, 23 Law, 12 Sanskrit and 11 Language Universities and rest 145 Universities are of other Categories. The top 8 States in terms of highest number of colleges in India are Uttar Pradesh, Maharashtra, Karnataka, Rajasthan, Andhra Pradesh, Tamil Nadu, Madhya Pradesh and Gujarat. At Ph.D. level, maximum number of students are enrolled in Engineering and Technology stream followed by Science. On the other hand at Post Graduate level maximum students are enrolled in Social Science stream and Science comes at number two.

The highest number of students are enrolled at Under Graduate level across India. Similar situation could be observed in States/UTs. Out of the total enrolment of 3,85,36,359 students, a vast majority of 3.06 crore students are enrolled in Under Graduate that is a approx. 79.5% of the total enrolment. On the other hand, second to Under Graduate, 11.2% students are enrolled in post-Graduation which is approximately 43.1 lakh students. There are 2,881 students enrolled in Integrated Ph.D. in addition to 2.02 lakh students enrolled at Ph.D. Level.

38986 students were enrolled in Ph. D. Programmes in 2019, The total number of Ph.D. students in Agriculture and Allied courses is 7292 out of which 54.9% are male students. The stream is divided into 4 sub-streams which are Agriculture, Horticulture, Forestry and Sericulture. At PG level, there are 30222 students enrolled in Agriculture and Allied sector with 61.9% male and 38.1% female students. As per AISHE 2019-20, 16 Commerce stream has 6544 students enrolled for Ph.D. with 43.6% male students and for PG level, 4.76 lakh students are enrolled with 63.3% female students. IT and Computer Science have total number of 3512 students enrolled for Ph.D. with 46.4% male students and at PG level, total number of student enrolled is 1.97 lakh with 51.2% male students[5].

The policymakers have been aware of such dismal state of research in India. The Question has been again raised on the quality and authenticity of research output. In the beginning of 2013 Government of India has launched (GoI) has launched, a string of initiatives to boost the number of researchers in Higher education. GoI announced the “Institutes of Eminence” [6] and supported them to

become world class universities. These institutes of Eminance are chosen on the basis of their research performance. For starters, HRD Ministry launched the Rashtriya Uchchatar Shiksha Abhiyan and strategically provide funds for higher education Institutes in the country.

In 2015, National Institutional Ranking was launched to rank universities and institutions with various parameters, including research.

"Prime Minister Research Fellowship" was announced in 2018. Under this scheme, undergraduate and post graduate students (with cumulative Grade Points of at least 8.0) from elite institutes such as IITs, NITs, IISc, IISERs will be directly admitted in Ph. D. Programmes and will be compensated under the scheme. India needs more funds in proportion to population. Department of state government should play an active role and allocate funds and grants wherever needed. There is a need for increased funding from private sectors for research. CSR funds are allowed to use for research project that will improve the situation but private sectors have to allocate more money for research.

Even after such helping hand of policy makers, the question still remains there that whether the research crisis in the country is only about scarcity of compensation or funds for scholars. Moreover, it needs to be examined why the schemes are restricted to a selected few elite institute in which only two percent of students are enrolled in higher education [7].

Analysts have long pointed to the problem of students "reproducing" textbooks in examinations without applying critical thinking—and such culture is carried all the way to higher education [8]. Students in India have historically focused on 'preparing for exams', and educational system is involving years of learning by rote, copious note-taking and narrow adherence to a syllabus. Therefore, it is essential that students be inducted pedagogically, in the culture of research, i.e., in the undergraduate level, by introducing UG research in the higher education curriculum [9]. If students are systematically taught competent research at the undergraduate level, they will get interested in the subject and might become more inclined to take up research-intensive academic programmes and careers in the future.

The proposed New Education Policy (2020) now emphasizes problem-solving and critical thinking skills will help the next generation of Indians finally 'prepare for life' and navigate uncertain futures. Covid-19 crisis has brought the reality and tested teacher`s ability to adapt and innovate them self. It is a challenge that teachers have overcome with dedication, moving with agility to remotely teach students online. With NEP 2020, teachers will have an opportunity to nurture these very same values of adaptability and innovation in their classrooms.

2. The scenario of undergraduate research in India

Higher education plays an extremely important role in promoting human as well as societal well-being and in developing India as envisioned in its Constitution - a democratic, just, socially conscious, cultured, and humane nation upholding liberty, equality, fraternity, and justice for all. Higher education significantly contributes towards sustainable livelihoods and economic development of the nation. As India moves towards becoming a knowledge economy and society, more and more young Indians are likely to aspire for higher education. For the purpose of developing holistic individuals, it is essential that an identified set of skills and values will be incorporated at each stage of learning, from pre-school to higher education [4].

At the societal level, higher education must enable the development of an enlightened, socially conscious, knowledgeable, and skilled nation that can find and implement robust solutions to its own problems. Higher education must form the basis for knowledge creation and innovation thereby contributing to a growing national economy. The purpose of quality higher education is, therefore, more than the creation of greater opportunities for individual employment. It represents the key to more vibrant, socially engaged, cooperative communities and a happier, cohesive, cultured, productive, innovative, progressive, and prosperous nation.

3.Some of the major problems currently faced by the higher education system in India include:

a. a severely fragmented higher educational ecosystem;
b. less emphasis on the development of cognitive skills and learning outcomes;
c. a rigid separation of disciplines, with early specialization and streaming of students into narrow areas of study;
d. limited access particularly in socio-economically disadvantaged areas, with few HEIs that teach in local languages
e. limited teacher and institutional autonomy;
f. inadequate mechanisms for merit-based career management and progression of faculty and institutional leaders;
g. lesser emphasis on research at most universities and colleges, and lack of competitive peer reviewed research funding across disciplines;
h. suboptimal governance and leadership of HEIs;
i. an ineffective regulatory system; and
j. large affiliating universities resulting in low standards of undergraduate education. National Education Policy 2020.

The main problem higher education in India is the system of affiliation, where a university can have as many as over 500 colleges attached to it. This simply makes the university, “ungovernable” [10]. Besides being a logistical and

administrative nightmare to the parent university, these colleges function in isolation and there is no real communication amongst the academic disciplines. It defeats one of the fundamental principles of a university of being an institution where students and teachers are able to exchange ideas and the different disciplines mingle, in the process learning from one another and finding ways to innovate [11]. Indian universities and affiliated colleges have failed miserably in this aspect. As such, much of the research in India happens in silos and are either irrelevant or redundant for any practical purposes. Moreover, research in India happens mostly in specialized research institutes rather than in university campuses [12]. However, about 80 percent of the students enrolled in higher education are contained in these university campuses that run undergraduate programmes [13]. Aside from basic research, due to minimal interaction between departments, there is a lack of interdisciplinary education and research in these campuses.

Undergraduate research can therefore serve as a way to initiate dialogue between departments and enhance relations between faculty and students. Moreover, this will also help build an inclination for research among undergraduate students and faculty who usually end up writing overnight projects as final-year research. Indeed, it has been found that a huge amount of this work is merely copied from websites that are not even credible, to begin with [14]. This in turn will increase the number of doctoral and post-doctoral candidates, who can then not only fill faculty positions [15], but also rethink and redesign curriculum for relevance and jobs of tomorrow. Introducing research at the UG level can both directly and indirectly address issues in higher education, including the lack of quality and quantity of publications produced, faculty vacancies, the absence of scholarly instincts in students, and outdated syllabi. Undergraduate research can also help in the overall up liftmen of delivery of classroom education.

While the experiences of other countries can provide valuable lessons, these models may not be able to capture the complexities and diversity of the Indian education system [16]. Thus, UG research needs to be embedded in programmes in such a way that it complements the current system of teaching, rather than disturbs it.

3. Improving Quality of Undergraduate Research:

Knowledge creation and research are critical in growing and sustaining a large and vibrant economy, uplifting society, and continuously inspiring a nation to achieve even greater heights. The knowledge societies that attained intellectual and material wealth in large part through celebrated and fundamental contributions to new knowledge in the realm of science as well as art, language, and culture that enhanced and uplifted not only their own civilizations but others around the globe.

A robust ecosystem of research is perhaps more important than ever with the rapid changes occurring in the world today, e.g., in the realm of climate change, population dynamics and management, biotechnology, an expanding digital marketplace, and the rise of machine learning and artificial intelligence. If India is to become a leader in these disparate areas, and truly achieve the potential of its vast talent pool to again become a leading knowledge society in the coming years and decades, the nation will require a significant expansion of its research capabilities and output across disciplines. Today, the criticality of research is more than ever before, for the economic, intellectual, societal, environmental, and technological health and progress of a nation [4].

The research and innovation investment in India is, at the current time, only 0.69% of GDP as compared to 2.8% in the United States of America, 4.3% in Israel and 4.2% in South Korea. The societal challenges that India needs to address today, such as access for all citizens to clean drinking water and sanitation, quality education and healthcare, improved transportation, air quality, energy, and infrastructure, will require the implementation of approaches and solutions that are not only informed by top-notch science and technology but are also rooted in a deep understanding of the social sciences and humanities and the various socio-cultural and environmental dimensions of the nation. Facing and addressing these challenges will require high-quality interdisciplinary research across fields that must be done in India and cannot simply be imported; the ability to conduct one ’s own research also enables a country to much more easily import and adapt relevant research from abroad.

Furthermore, in addition to their value in solutions to societal problems, any country's identity, upliftment, spiritual/intellectual satisfaction and creativity is also attained in a major way through its history, art, language, and culture. Research in the arts and humanities, along with innovations in the sciences and social sciences, are, therefore, extremely important for the progress and enlightened nature of a nation.

Research and innovation at education institutions in India, particularly those that are engaged in higher education, is critical. Evidence from the world’s best universities throughout history shows that the best teaching and learning processes at the higher education level occur in environments where there is also a strong culture of research and knowledge creation; conversely, much of the very best research in the world has occurred in multidisciplinary university settings.

India has a long historical tradition of research and knowledge creation, in disciplines ranging from science and mathematics to art and literature to phonetics and languages to medicine and agriculture. This needs to be further strengthened to make India lead research and innovation in the National Education Policy 2020. 21st

century, as a strong and enlightened knowledge society and one of t the three largest economies in the world. Thus, the new Policy envisions a comprehensive approach to transforming the quality and quantity of research in India. This includes definitive shifts in school education to a more play and discovery-based style of learning with emphasis on the scientific method and critical thinking. This includes career counseling in schools towards identifying student interests and talents, promoting research in universities, the multidisciplinary nature of all HEIs and the emphasis on holistic education, the inclusion of research and internships in the undergraduate curriculum, faculty career management systems that give due weightage to research, and the governance and regulatory changes that encourage an environment of research and innovation. All of these aspects are extremely critical for developing a research mindset in the country.

To build on these various elements in a synergistic manner, and to thereby truly grow and catalyse quality research in the nation, as per new policy, envisions the establishment of a National Research Foundation (NRF). The overarching goal of the NRF will be to enable a culture of research to permeate through our universities. In particular, the NRF will provide a reliable base of merit-based but equitable peer-reviewed research funding, helping to develop a culture of research in the country through suitable incentives for and recognition of outstanding research, and by undertaking major initiatives to seed and grow research at State Universities and other public institutions where research capability is currently limited. The NRF will competitively fund research in all disciplines. Successful research will be recognized, and where relevant, implemented through close linkages with governmental agencies as well as with industry and private/philanthropic organizations.

Institutions that currently fund research at some level, such as the Department of Science and Technology (DST), Department of Atomic Energy (DAE), Department of Bio-Technology (DBT), Indian Council of Agriculture Research (ICAR), Indian Council of Medical Research (ICMR), Indian Council of Historical Research (ICHR), and University Grants Commission (UGC), as well as various private and philanthropic organizations, will continue to independently fund research according to their priorities and needs. However, NRF will carefully coordinate with other funding agencies and will work with science, engineering, and other academies to ensure synergy of purpose and avoid duplication of efforts. The NRF will be governed, independently of the government, by a rotating Board of Governors consisting of the very best researchers and innovators across fields.

The primary activities of the NRF will be:

a. Fund competitive, peer-reviewed grant proposals of all types and across all disciplines;

b. Seed, grow, and facilitate research at academic institutions,
c. Act as a liaison between researchers and relevant branches of government as well as industry, so that research scholars are constantly made aware of the most urgent national research issues, and so that policymakers are constantly made aware of the latest research breakthroughs.
d. recognize outstanding research and progress.

4. Role of institutions:

In India, initially, Grade 1 and Grade 2 [17, 18] autonomous colleges under the University Grants Commission (UGC) can begin the process of initiating such research-integrated programmes in their three-year undergraduate courses. This is because they have a higher degree of freedom from regulations and a track-record of excellence in delivery of quality education. The institution will also have to duly recognise the efforts and contributions of the faculty and students, and formally set up an office for UG research to institutionalize the process. The internal budgets of these institutes should set aside some funds exclusively for nurturing of UG research and activities under them.

5. Types of UG research experience:

For reasons such as scarcity of financial and infrastructure resources with the government-run universities, to begin with, CURE can be a valuable experience for undergraduate colleges. Moreover, given the large number of students in the higher education institutes, CURE will offer a more inclusive system of research and education by giving opportunities to a larger group. Given the typical characteristics of a CURE, such courses will need capable instructors. In India, such instructors can be faculty, PhD students or post-doctoral students. A valuable way of involving external instructors is from specialized research institutes in India such as IISERs, IISc, Tata Institute of Fundamental Research (TIFR), Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), among others. Some researchers from elite research institutes should dedicate certain credit hours in helping undergraduate students understand the nuances of ethical research and involve them in ongoing activities. It is time for this segregation of research and teaching institutes to fade out and make way for the blending of high-quality research in specialized institutes, and university teaching. The same has also been recommended by the 2009 Yashpal Committee Report on ‘Renovation and rejuvenation of higher education [19].

6. Optimal use of resources and external collaboration:

It is recommended that “doing more with less”, and by involving professionals from research institutes as instructors of UG research, the higher education system will be able to deal with shortage of faculty and reduce their workload [20]. While this can be one of the ways of sourcing an instructor, it is

highly recommended that faculty in undergraduate colleges get involved in this process eventually for a profound impact of the system of UG research. Having said that, faculty/instructors need to be rewarded for their engagement in the process to ensure fruitful collaboration and quality output. Since the faculty in undergraduate colleges have heavy work-load, a committee must be set up to deliberate on ways of distributing the work among various faculty within departments [21]. The University and state governments need to jointly mull over the degree and form of reward needed to encourage such a system.

7. Preserving multidisciplinary nature:

To maintain the multidisciplinary nature of this programme, UGC's choice-based credit system needs to be intertwined with the UG research programme, so as to allow mobility of students within disciplines, campuses and external organisations [22]. The course content needs to be carefully designed by scientists and experts, in collaboration with all streams of education. Such a curriculum should set a tone for research for students before they formally enter into a collaborative research environment.

8. Integration of basic research skills : Students should be inducted in the first year with 'professional skills workshops' that train them in basic skills such as writing research papers and reports, designing posters, conference presentations, networking with resources, identifying paper competitions, fellowships and graduate programmes, among others [23]. They can also be asked to write mock papers on topics in the textbooks. In the second year, students can choose their area of interest and attach themselves with either an ongoing research or initiate one with the help of their mentors/instructors. However, the choice to participate in UG research should be voluntary and optional. In the third year, students should undertake writing their papers and submitting papers for conferences. There should be continuous capacity building of mentors by senior faculty or external resources, assuring high-quality mentoring to students. Research-educated UG students will also be informed PhD students; thus, in India, while accepting a PhD proposal, preference should be given to students with UG research experience.

9. Inter-institute network of conferences: Institutes should initiate conferences where UG researchers can present their papers before their peers, so that it becomes a trial ground for them for larger, national or international conferences [24]. Mentors should also assist students in getting published in existing UG research journals and/or offer them co-authorships. While institutes can modify and customize various ways to implement UG research,

UG research is not completely absent in India. The problem is that it is not being practiced—in a structured, systematic way—in universities and affiliated colleges thus far. An interesting concept is the National Initiative on

Undergraduate Science (NIUS) by Homi Bhabha Centre for Science Education, TIFR. Conceptualized in 2004, this initiative aims to address the declining number of meritorious students in Bachelor's and Master's Science courses and subpar undergraduate education across the country. It shortlists 150 students from across colleges in India through competitive exams and admits them in a two-year 'nurture' programme. Students go through two one-month camps in summer and two two-week camps in winter, and learn theory, problem-solving skills, attend student seminars and laboratory sessions. The first year is spent on training for the research, and the second year is for performing actual research under the mentorship of scientists from institutions such as TIFR and Bhaba Atomic Research Centre (BARC) [25]. Similarly, at the Indian Institute of Science Education and Research (IISER), students in the five-year integrated BS-MS Degree programme participate in a year-long research project. They are encouraged to publish in peer-reviewed journals and also present their papers in international conferences.

This brief makes the case for embedding research in UG courses. The aim is to make research commonplace and push it out of specialised research centres and into the University system.

10. Conclusion

India is attempting to enhance its global footprint through programmes such as 'Institutes of Eminence' (IoE)[48] and 'Study in India'[49] as well as by preparing a New Education Policy.[50] It is crucial at this time, therefore, to focus on the quality of undergraduate education. India has a rich demographic dividend that, if harnessed successfully, can contribute to the country's economic growth. However, the Indian education system needs an overhaul. While a handful of institutes have been given the tag of IoE for greater autonomy in conducting research and programmes, there are numerous state public universities, affiliated colleges and autonomous colleges that are striving to compete with the raised standards.

Institutes around the world are reaping the benefits of adopting UG research as a practice. In India there are also some universities such as the MIT that have moved over to advanced UG research. The Indian education system has about 20 million first-generation learners, who will eventually need systematic induction to utilize education as a tool to tackle real-world challenges. Moreover, the girls among them will need particular attention to encourage them to pursue fields in STEM (Science, Technology, Engineering and Mathematics).

The Indian education system must explore ways by which it can upgrade its current, textbook-heavy learning system. Introducing UG research in institutes will not only enhance the quality of students and faculty in the system, but also help

India generate relevant scholarly research that will contribute to the country and beyond.

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Data Analysis

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Abstract

We are living in the era of Information Technology, where enormous amount of data is available on hand, huge in amount, high in variety which makes them difficult to handle. Due to rapid growth of available data solutions need to be studied and provided in oreder to handle and extract valuable information and knowledge from these datasets. Such value can be provided using Data Analysis.

Keywords : *Data , Analysis , Information etc.*

Introduction

Data are individual facts Statistics or items of information, they can be set of values of variables about one or more persons, objects. Data are smallest units of information that may be abstract ideas or measurements or statistics often numeric. In general data refers to the fact about some existing information or knowledge. Raw data is a collection of numbers or characters, instrument reading, figures known as Primary data.

Data :

Data is building block on which any Organization thrives. We cannot imagine a world without data storage. Every detail about a person or organization, every transaction performed, every documentation is saved directly after use. Using this data stored organizations extract valuable information and knowledge and performs detailed analysis which provides new opportunities and advantages. With the rapid advancements in technologies and the internet, increase in storage capabilities, methods of data collection huge amount of data have become easily available nowadays. More and more data is being created in every moment which needs to be stored and analyzed in order to extract as much value as possible from the huge amount of data. The variety of such sheer amount or rapidly changing data need to be properly analyzed to extract pertaining information.

Data are used in scientific research, business management, finance, governance and in every other form of human organizational activity. Data are used as a basis for decision making, reasoning, discussion or calculation. Data are measured, collected, reported and analyzed and visualized by creating graphs, tables, and images. Data refers to the fact that some existing information or knowledge is

represented or coded in some suitable form for better usage or processing. Data are gathered through a primary source or secondary source.

What is Data Analysis:

Data analysis is the process of data management, data collecting, storing, organizing and analyzing. It includes systematically applying statistical and or logical techniques used to describe, illustrate, condense, evaluate and communicate the results. It focus on turning raw data into useful information and statistics. Data analysis can be illustrated as analyzing past or future situations systematically and making decisions based on it.

Data analysis methodologies vary and include data triangulation and data percolation which includes method of collecting, cleaning, classifying and analyzing to maximize the researcher's objectivity and understand the phenomena under study or investigation as complete as possible. The data using a series of steps are then percolated to extract the most relevant and useful information, and interpretation for result of analysis.

Goals of Data Analysis:

The goal of data analysis is to discover usable and useful information, to describe and summarize data to identify relationship between variables and compare variables, to forecasts outcomes, conclusions and supporting in decision making. Data analysis is used in different business, science, social science domains and plays a crucial role in making scientific decisions and helping business operate more effectively.

Types of data to be Analyzed:

There are several methods and techniques to perform data analysis depending on the aim of the investigation. All these methods are based on two, main areas: Qualitative and Quantitative research.

Quantitative data deals with data that can be expressed as a quantity i.e. Numbers, percentages and statistics and can be feed in to spreadsheets. Qualitative data deals with features or characteristics and is expressed in words that describes something.

Data Analysis methods:

Text Analysis combines statistical and linguistic analysis methods which can extracts and classifies information. Using text analysis natural spoken or written human language is transformed in to machine-readable data. Business use text analysis for positive /negative/neutral polarity of opinion.

Data mining is the process of detecting anomalies, patterns, and relationship to predict outcomes. It involves clustering, sequential pattern mining and anomaly delectation (rare items or unusual records) Using data mining markets behavior is predicted.

Statistical Analysis includes Descriptive and Inferential statistics. Descriptive analysis data analysis describes summaries and visualizes the basic features of data through charts and reports. The common measures of Descriptive statistics analysis are frequency (count, percent), Central Tendency (mean, median, mode) Dispersion (range, variance, standard deviation),Position (percentile ,ranks). Inferential statistics data analysis draws conclusion based on samples that represents entire population and this is done through methodologies like hypothesis tests and estimation theories. Statistical analysis like regression analysis are used to carry out market research.

Diagnostic analysis identifies anomalies and uncovers patterns in data and helps to determine whether there is high or low correlation between data points and possible causes and can be used to find answer of why did something happened.

Predictive analysis is connected with what is likely to happen, used in sales analysis. It often combines demographic data and purchase data with other data to predict the actions of customers.

Prescriptive analysis analyzes multiple scenarios, predict the outcome of each and decide what action to take, which is the best course of action based on findings .artificial Intelligence is an example of Prescriptive analysis.

Advantages of Data Analysis

- ✓ With the help of analyzed data more faster and informed decisions backed by facts can be taken.
- ✓ Action required performance issues can be identified.
- ✓ Analyzed data helps to deeply underst and customers' requirements thereby creating better business relationships.
- ✓ With the help of analyzed data different dimensions of data can be visualized.
- ✓ Financial performance of the business can be understood in more better ways also competitive advantage gained.
- ✓ Data analysis helps to reduce costs, loss and thus increasing profits and overall performance.

Conclusion: There is endless possibilities of data analysis when you know how to do it scientifically and systematically .from the number of solutions and conclusions derived from analysis we may to get real insights from our data that can offer huge advantages and potential advancements for our company, business or problem under study.

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Multidimensional Use of Content Analysis Method in Interdisciplinary Research Studies

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Abstract

Language is of paramount importance in human life. The only visible progress of human beings today is due to language. Human beings express their thoughts more through language than symbols because it helps to express emotions, knowledge, opinions, thoughts, and values. Written literature has increased the importance of print media. But today, media, like television, radio, cinema, telephone, computer, internet, mobile, etc., transmit ideas, beliefs and values more than print media. Written and illustrated analysis of these communication tools has now become a systematic process of extracting content based on a wide range of dissemination. That is why the content analysis process must be evaluated in the form of research techniques to analyse the content of the disseminated content and describe the person. Content analysis is an important method of disseminating content analysis. The use of this research method in educational and social research started in the 20th century and it is increasing day by day. The purpose of this research method is to perform quantitative and qualitative analysis of the Literature, Documents, and Books, Newspapers, Journals and other written material obtained.

Keywords- *Content analysis method, objectivity, basics, types of content analysis, process of content analysis method, flow of content analysis, educational utility etc.*

Introduction

In today's field of research, content analysis method is considered as an objective method because the presence of researcher has no effect on the media. It can also collect all information and suggestions impartially. Therefore, other researchers can also study and verify their findings. This method does not raise any question about the bias of the answers. This method is being used more and more in research. That is why the use and importance of this method is increasing day by day. An analysis of a completed questionnaire or schedule is an example of a reality content analysis. The relationship between content analysis is verbal and face-to-face but in modern industrial society communication is seen as complex and intricate. Because communication is becoming indirect, mass media such as newspapers, radio, television, movies, computers, internet, mobiles, etc. have become. In fact, scientific and technological advances have made significant contributions to the development of mass communication tools. The importance and usefulness of this method is increasing day by day especially in the field of education.

Meaning and concept of content analysis method

Content analysis is a method of research related to the analysis of actual content. The purpose of this research method is to perform quantitative and qualitative analysis of the material, documents, books, newspapers, journals and other written material obtained. In other words, what is said by the media is analysed by this method. The meaning and concept of content analysis method can be more clearly understood from the interpretations given by various thinkers and researchers.

1. Whapples and Berlusconi - 'Systematic content analysis method seeks to provide a more functional interpretation of the content description so that the nature and relative effect of the stimuli provided to the reader or listener can be expressed objectively.'
2. Kaplan and Goldson - 'The purpose of content analysis is to systematically compute the categories of a given content so that the relevant facts can be deduced from the assumptions related to the content.'

Characteristics of content analysis method - Features of content analysis method can be stated as follows.

1. Content analysis method is useful only for generalization in social sciences.
2. This method only deals with the determination of the effect of the initial form of propaganda or communication.
3. This method is based only on the specific and internal effect of the sentences of the languages.
4. This method is objective.
5. This system is orderly and streamlined.
6. This method is computational.

Process / Steps of Content Analysis Method - Content Analysis Method is a research method of collecting important information from second material or written material. That is why the process of compiling instructions through this method is completely different from other methods. The steps of this method can be explained as follows.

1. **Problem Solving -** The first step of content analysis method is to fix the problem. The problem to which information or information is to be collected has to be determined.
2. **Explanation of the problem -** At this stage, the problem related to the research problem is identified by identifying the problem which has been identified for content analysis. Many social problems such as caste violence, mass violence, Balutedar system, and interdependence of caste, organization of political groups on the basis of caste, demand for votes on the basis of

caste, organization of cabinet on the basis of caste can be explained on this basis.

3. **Selection of Mass Communication Tools -** This is the third step of content analysis by which one or more communication tools are selected from the useful communication tools and from which problem related facts and figures are compiled. Movies, Radio, TV, Newspapers, Magazines etc. There are many means of communication. The right tool has to be selected according to the purpose of the research topic.
4. **Choice of Unit of Analysis -** After selecting a useful tool one has to make an important decision as to what will be the unit of content analysis, such unit in a newspaper can be word sentences, whole newspaper, occasion character, place, time etc.
5. **Selection of problem related material -** Selection of problem related facts is the next step of content analysis. For the study of the weaker class, all the news related to the weaker class, editorial articles, letters and reactions of the readers in the name of the editor, cartoons etc. should be cut from the newspaper and a register should be affixed neatly.
6. **Analysis of content -** It is analysed after selection and compilation of facts. Different types of content analysis are used for this.
7. **Report Writing -** The last step in the content analysis process is report writing. The report has to explain the problems in more detailed, clear, comprehensible, easy language. The report is written in a way that even the average reader can understand.

Objectivity in content analysis - The question is how to maintain objectivity in content analysis. In 1952, Bernard Berelson suggested that the following four procedures be followed to make content analysis more objective.

1. **Rule Demonstration Process -** It is believed that there are three essential things to bring objectivity in content analysis. For content analysis, it is not so much the method adopted by the researcher to keep the developed class or component classes in each other, but it is more important to reveal the methods and rules used by the researcher to evaluate them and how their conclusions have been drawn.
2. **Systematic Procedure -** Following a systematic process along with a rule-directed process contributes to the objectivity of content analysis. Suppose some newspapers want to analyse communal violence in the city in comparison to editorials and news. In order to maintain comparative validity in such a case, the same process of recording the contents of each newspaper must be used in a systematic manner. For example, every newspaper should have a reference to the beginning of violence, reports of incidents inciting

violence, police reports, number of dead and injured persons, political leaders, judges, social activists.

3. **Quantitative description -** It is necessary to calculate the frequency of content published in various newspapers, magazines and other factors and compare its validity. It is necessary to determine the depth of a particular movement. Suppose we look at different aspects of the education system e.g. A comparison of five different colleges on the basis of autonomy, conducting examinations, re-evaluation, teaching by teachers, student organization, representation of students on different committees, allotment of extra time to clerks etc. can be successful only when its positive and negative comments are assessed. This will usually be different from the frequency calculation.
4. **Qualitative Analysis -** In content analysis, focusing only on completeness according to the calculation of frequency, or focusing entirely on the collection of elements, will mean forgetting the whole reality in the collection of elements. For this, it is necessary to use both quantitative and qualitative techniques with each other.

New Trends in Content analysis Method - Content analysis method has been increasingly used in social research since the beginning of twentieth century. There have been many stages and trends in this technique during this century. Lindsay Gardner has outlined further trends in this research technique.

1. There has been a significant increase in the actual frequency of content analysis.
2. More emphasis is being placed on theoretical and hypothetical cases.
3. This method is being used extensively for the study of a wide range of social problems.
4. In addition to full descriptive research, methods are also used to test such hypotheses.
5. There is more variety in the content of the study. The areas in which this research technique is used are sociology, medicine, psychology, political science, journalism and mass media.
6. This technique is used in social research along with other research techniques.
7. Content is being analysed with the help of computer. This has led to record progress in objectivity.

Advantages of Content Analysis Method - Content analysis is an important method of disseminating content analysis. Its use in social research started in the 20th century and it is increasing day by day. The following indications are that the usefulness of content analysis for dissemination research as well as psychological study specialty personality study is increasing day by day.

1. **Auxiliary to objective study -** Content analysis method is considered as objective method because the presence of researcher in it has no effect on the

media tool. It can also collect information and information in an unbiased manner, which often does not even require direct observation. At the same time, he has another basis for objectivity. Therefore, other researchers can also study and verify their findings. This method does not raise any question about the bias of the answers.

2. **Aids in the study of personality -** Content analysis have proved to be especially useful in studying the psychological condition of individuals and groups as well as their personality. It is useful to study the mental inclinations and personality traits of the people at a particular time. This method is more useful for low cost and limited resources.
3. **Assist in the study of past social life -** Books, newspapers, magazines and other representative tools are used in the content analysis method without directly combining information and information. So the biggest advantage of content analysis is that with the help of this method past social life can also be studied.
4. **Assist in describing the trend of communication content -** Content analysis is considered to be the most effective tool for describing the short and long term trends of communication content. This method is especially important for publicity. It is a powerful tool for evaluating personal or social values.
5. **Assist in the study of subject development -** Content analysis can be based on the analysis of material taken over different periods of time to develop the idea of the development of the subject or at the same time by analysing the research in different countries. Pvt
6. **Assist in the international study of communication materials -** In today's modern age, the media has an important place in national development. It is possible to know the distance between the communication tools and communication events in different countries by comparing them. This study is extremely useful in the development of international tools.
7. **Auxiliary to communication tools -** Content analysis can be done by comparing different means of communication like radio, television, newspapers, magazines etc. to find out which of these tools is more effective. Knowing this is essential for government promotion and advertising.
8. **Getting information about the propaganda method -** What methods, topics, events, songs, poems, slogans, slogans, etc. create public opinion and are very effective and attractive in the campaign can be discovered through content analysis. Find out which of these items are more popular among the people. This method is also used to test the initial thoughts, hypotheses and theories.

Limitations of content analysis method - Content analysis method is very useful but not completely flawless like other methods. Some of the limitations of this method can be stated as follows.

1) Limited use - Content analysis method is used in a limited way. In fact, this method is used only to analyse the material available through written material or other dissemination tools.
2) Rely on secondary content only - Content analysis has to rely only on secondary content figures. This secondary content may be biased. This is because mass media is more about promoting cultural ideals than actual action. In most countries, the mass media is controlled by the government or operates under government control.
3) It is difficult to assume the validity of the content in the content analysis method.
4) Content analysis method is an unplanned and non-consistent method of research.
5) Research studies in content analysis method may be affected by latent bias.
6) Often the required documents are not available to the researcher in this method.

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Qualitative Research the Concrete Application in Social Science Researches

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Abstract

In the field of social science research qualitative research is used habitually in present perspective. In the past, the emphasis was only on quantitative research, but as a matter of time, the need for new mechanics was realized and from that need the emergence of qualitative research. In the field of social research mostly numerical research was done till 1970's decade. Later, however, researchers found that scientific methods for studying social problems were very mechanical. In 1999, Anne Burns wrote, 'It fails to take into account how human situations, experience and behaviors construct realities that are inherently subjective.' As a result, new alternative approaches have been suggested based on the assumptions about the nature of social problems and the nature of realities derived from research in modern physics. This approach is known as naturalist perspective. Based on this new approach, the research methodology is known as Naturalistic Inquiry or Qualitative Research or Interpretive Research. Qualitative research or descriptive research using the concept of events, the situation, the various participants included naturally, is to try to understand the events or circumstances personalized observations. Since the main objective of qualitative research is to perform the theory based on the basis of the data, the collected data is analyzed in a systematic way.

Keywords - *Qualitative Research, Analytical Approach, Social Research, Investigation, Observation etc.*

Introduction

Qualitative research or descriptive research using the concept of events, the situation, the various participants included naturally, is to try to understand the events or circumstances personalized observations. It is not possible to have such a hypothesis. Research questions are formulated instead of hypotheses. It is like analyzing what we have seen or experienced. In qualitative research, prejudice has no place. Prejudice is not given when observing or describing individuals, events, situations, etc. The situation or event presented is negative or positive without any change in it. As with the process of numerical research, the process of qualitative research is not predetermined. The planning of qualitative research cannot be determined in advance of the actual course of the

research study, because the meaning of events is contextual and reality is multifaceted. What the researcher wants to know in the actual field of study always depends on the interaction between the researcher and the respondent. And it is impossible to understand the nature of the interactions that occur through the interactions.

Meaning and Concept of Qualitative Research

The wrong understanding of qualitative research to understand the definition, the Statistical research is the only way for the research. But in reality, different approaches are used in qualitative research. These include mainly person studies, anthropological practices, field studies, natural investigation, etc. All of these approaches break into this concept of qualitative research. At the core of qualitative research, there are two important hypotheses regarding the nature of human behavior. They are as follows.

1) naturalistic-environmental hypothesis

2) qualitative-metaphysical hypothesis

1) Naturalist-Environmental Hypothesis - believe it naturalist, his behavior is not very significantly affected her behavior happens in the situation. Human behavior is never free from context. It is always contextual. This means that straight, you will need to do in the context of the natural person if you want to study behavior and study the context in which the behavior is happening without artificial laboratory and control the environment or situation.

2) Qualitative-Metaphysical Hypothesis - the confidence of naturalist another, without involving researchers and the subjective awareness or perception of the process and it is impossible to understand the true beliefs research on human behavior. In fact, it is objective. The researcher's perceptions have nothing to do with it. The hypothesis that realism is context-free is paradoxical, and the second consequence is that the methodology of the scientific system is not only incorrect but irrelevant.

Both of the above important hypotheses are at the root of qualitative research. It emphasizes the importance of observation in a natural environment. It also shows the importance of scientific and quantitative studies of human behavior. To understand the concept of qualitative research in more detail, some definitions need to be considered. The definitions of qualitative research can be explained as follows.

Definitions of Qualitative Research - Different experts and researchers have defined qualitative research as follows.

1) Marshall Roseman (2006) - Investigation is the interactive process between the researcher and the participant, considering that the researcher needs to integrate with the daily life of the area selected for the study, emphasizing the life-course

perspective of the participants and exploring that perspective. Qualitative research is the descriptive and analytical process that assumes this and relies on common verbal representations and visual behavior for primary support material.

2) Strauss & Corbin (1990) - Qualitative research is any kind of research that concludes without the use of any kind of statistics or performance tools.

Characteristics/Features of Qualitative Research - The qualitative research features can be described as follows:

1. The process of qualitative research is emerging, developing. It is also evolving.
2. In qualitative research, the researcher himself serves as a major tool for the collection of data.
3. The main purpose of qualitative research is to perform the theory based on the basis of the material.
4. Qualitative research involves the study of the whole of the whole social reality or reality in a holistic manner.
5. In qualitative research, the basis of the content is descriptive, it is expressed through words.
6. Analytical approach is used in qualitative research for the analysis of base material.
7. In qualitative research, the process of collecting and analyzing the data is done simultaneously.
8. In qualitative research, social phenomena or behavior are studied as relative. Social behavior or events that occur in the area. Researchers go to that area to study them.
9. The qualitative research that the researcher interprets as material. It is scrutinized by responses that provide content. Only after this scrutiny will the final conclusions of the research are presented. This is what is called the result of negotiation.

The various qualities of qualitative research can be explained as above. One thing is

clear, descriptive analysis is of particular importance in qualitative research. Statistical tools are not used in any way.

Assumptions of Qualitative Research - The following are the assumptions of qualitative research by the researchers of Lincoln and Guba.

1) The nature of reality - Realities are both constructed and multiple. It is possible to study them holistically. The universe is not a machine made up of many objects, but it is an impenetrable, dynamic whole, and all its parts are inextricably linked. It is impossible to separate reality from the elements that exist independently.

2) **Relations between the Knowledge and Knower -** Observers and observers are constantly interacting with each other to influence each other. Questionnaires, interviews, and physical observations are the traditional ways of collecting supporting content. Because you are being asked questions or being his observations and realize. This perception changes the response of the users. Not only does the observation process give the object a different shape by agitating it, but it also gives the observer a different shape.
3) **Probability of generalization -** It is not possible to execute a general rule relative to a truly universal site-time independent, always and everywhere applicable to the investigation process. It is for this reason that generalization is not the purpose of research, but the main purpose of research is to develop a collection of subjective knowledge in the form of tentative hypotheses that describe each individual entity.
4) **Probability of Cause and Effect Relation -** It is impossible to distinguish between cause and effect. Because all individuals, objects, and events in the universe are in a position to influence each other by simultaneous interruption. Naturalistic Cause-Effect relationships accept the idea of shaping interdependencies rather than one. In their view, not all existing objects are isolated from each other and are connected in a Cause-Effect relationship. On the contrary, all these elements are constantly interacting. There is no definite direction to these interactions. Nothing can be predicted about their results. The interaction of these components is much more likely to result in function. It is impossible to say exactly what the exact cause of the performance is.
5) **Role of Values in Investigation -** Investigation is value. That value is never absolute. Investigators and the values of the selected design the heart of investigations, and for the collection of data, the heart of the original theory used to dictate interpretations of the results of its analysis and obtain with reference values and is becoming a major impact on the researcher or common. In addition, if the value of relevance to the research problem, approach theory and context is valid, the conclusions obtained will be reliable and feasible; otherwise the findings of the research will be questionable.
6) **The Nature of Research Process -** As with the process of Statistical research, the process of qualitative research is not predetermined. The planning of qualitative research cannot be determined in advance of the actual course of the research study. Because the meaning of events is contextual and reality is multifaceted. What the researcher wants to know in

the field of actual study is always dependent on the interaction between the researcher and the respondent. And the nature of the interactions resulting from the interactions is impossible to discern without actually seeing them. Since the main objective of qualitative research is to base the theory based on the data, the collected data is analyzed in a quantitative way.

7) **Research Language Style -** language style must be very subjective in qualitative research, writing of research studies in natural persons involved, depicts, my, it must use proper pronoun like I. Writing should be informal, literary. The main task of a qualitative researcher is to draw a real picture of the universe in the field of study, and want to express in own language. The writing should be detailed enough. Instead of Statistical terms such as internal symmetry, external symmetry, reliability and objectivity, use qualitative terms such as honesty, transferability, dependability and competence.

Methods of Data Collection in Qualitative Research

In qualitative research, information is collected in three ways.

1) Endless in-depth interviews 2) Direct observations

3) Written information

1) **Endless in-depth interviews: -** Interviews are interactions between the research and the applicant or the heart. Interviews are an important research tool. According to John Daley, The Interview is a conversation with purpose. In-depth interviews allow the user to obtain information both in the form of inputs as well as in the objective form. Therefore, users' doubts can be resolved well and from the information obtained, objective conclusions can be drawn. Such interviews provide direct and in-depth information about people's experiences, their opinions, feelings and knowledge.
2) **Direct observation -** Direct observation can give a thorough description of people's experiences and various actions. During the actual inspection, no bias is given to the bias. Human experiences of visual appearance are monitored.
3) **Written information -** Various types of records, paragraphs, statement leaflets, office publications, brochures, reports, personal records are analyzed by analyzing various types of written text.

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Web Based Resources and Risk Factors

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Abstract :
Research is careful data collection. It is analyses and observation of result . There are various resources available for data collection. Now a days many of researchers use web based resources for collection of information. Resources according to its nature can be broadly divided in two types. These are primary resources and secondary resources. Primary resources comprise original works such as autobiographies, textbooks, research articles, thesis etc. Secondary resources comprise critical books, biographies, web pages etc. There are advantages and also disadvantages in using web based resources. A researcher has to be careful in case if he suspects the authenticity of the information .He can try anti-plagiarism checker software.

Key words : *Web based resources, autobiographies, biographies, authenticity, anti plagiarism reputation.*

Introduction :

Now a days people often talk of research. Everyday the world comes to know about the new inventions .Inventions are possible only through research. Research needs methodology. Methodology helps the researcher to develop his research systematically .Research is careful, critical enquiry. Research is careful data collection and its analysis. For data collection there are many resources. The researcher has to visit personally to expected places, library, laboratories, etc. He has to sometimes conduct interviews ,distribute questions .People from various fields of life respond to the question ,put their views. These are assimilated and analysed by the researcher to reach to outcome .Research is unending process . It is a search again and again. It is undertaken to gain knowledge. It also is undertaken to get degree .It is sometimes funded by other agencies but in many cases research is self funded.A researcher has to bear the expenses of collection data on his own.

Data Collection:

Any type of research is based on data collection. It may be research paper, project, MPhil thesis or PhD thesis. The researcher has to take the efforts for data collection. Sometimes he has to travel long distance. Sometimes he has to pay heavy charges to hire the machines. It is lengthy and complicated process but a researcher has go through this .A researcher generally has to collect data according to data nature as below.

1) Primary Data
2) Secondary Data

Primary data includes original books, autobiographies, original work by others such as thesis, books by authors , research articles etc.

Secondary data includes wide range of resources. It gives second hand information. It includes critical books, books, journals, article, web pages , online newspapers , magazine ,television website such as NBC or CNN, peeretc. The researcher has to think about many other sources also for data collection. This paper deals with risk factors in web based resources. Generally we can bifurcate web based data resources on the basis of advantages and disadvantages.

Advantages:

Web based resources are easily available. Within a single click the information is available. It is handy. It is time saving. A lot of variety of information on the same topic is available. It is cheap. It can be stored in device such as PD, Hard Disk etc. The researcher can use it anytime , anywhere. The use of audio - visual aids is more advantage of web based resource. It saves the cost of stationery .One doesn't have to carry bundle of papers, pen, pencil , book etc .A small electronic gadget such as mobile ,tab, laptop, camera are some of the examples of effective electronic resources which help the researcher for data collection. These resources are very effective in giving accurate readings. Accurate readings then further help the researcher to give correct result. These are handy and can be carried easily anywhere.

Though there are some advantages of web based resources, there are some risk factors also. These disadvantages and risk factors are explored by researcher in depth to some extent. Disadvantages and risk factors are listed as below.

Authenticity is in question:

Online web resources are easily accessible to anyone. Any of the person can add any of the information in the original draft. This misguides the user. The user use this hybrid information for research. There he commits mistakes then wrong information gets perculated among the people .Some may challenge the authenticity of the research. And researcher then gets in trouble.

Scrolling :

At the time of observation or reading, the information on the screen may be diagram, letters, graph , pictures , slide. This scrolling of information is difficult to catch. It flashes only for limited time. In case if the researcher fail to catch the information in time ,it disappears. The researcher then finds it difficult in retressing it back .

Stress on eyes:

While collecting the information through web based resources, the researcher has to be very much alert. He has to watch very sincerely on whatever is displayed on the screen. It is time consuming. This add stress on eyes. Eyesight gets affected by it. Due to stress on eyes. researcher and employees working in software companies have to visit eye specialist. In the long run visually they get disabled. They have to undergo the treatment . Continue stress on eyes add glasses on nose.

Net problem :

Now a days every electronic gadget holder talk about net problem. Not a single online web based device work without internet connection. Without internet connection every device is like an empty box .On many of the occasion at far reaching places, the researcher or user cannot get the range. Therefore he gets in

trouble. More over internet connection charges are increasing day by day. The researcher has to spend big amount on it . A researcher can get discouraged if the power supply is cut in between .

Devices get Corrupted

A researcher is always afraid of this issue. He collects data in PD, Hard disk, computer etc. These sources stop to function if they get attacked by some unknown virus . After the devices get corrupted, the researcher at loss .He can not retrieve that original information. He feels upset .Resources of this can kill his sprit of research permanently.

Plagiarism :

Plagiarism is the most serious draw back and risk that the researcher invite while collecting data through web based resources. The researcher begins to copy down the content easily available on websites. Some websites are absolutely fake . They provide fake information . Researcher Knowingly or unknowingly adopt it thinking it as an authentic presentation . They are betrayed. There are some serious consequences of plagiarism. Plagiarism can cause loss of reputation. Plagiarist has to face legal action. Eventually he has to face ethical problem. Web based resources entice the researcher for plagiarism . There are many anti-plagiarism apps. The researcher can try them to avoid further troubles. But one thing is sure that web based resources are prone to risk factors.

Conclusion :

Every day the world comes to know about new inventions. Research leads to the researcher to invent something new. He has to take efforts to collect data. For data collection, the researcher has to try variety of resources. The collected data might be divided in to primary data and secondary data. This paper deals with the risk factors in the data collected through web based resources. There are some advantages of the web based resources. Web based resources are easily available, cheap and time saving. There are certain disadvantages too . Web based resources are always challenged on the basis of authenticity. They damage eyes. No net , no power supply, no work . Plagiarism is also one more serious risk factor regarding web based resources .

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